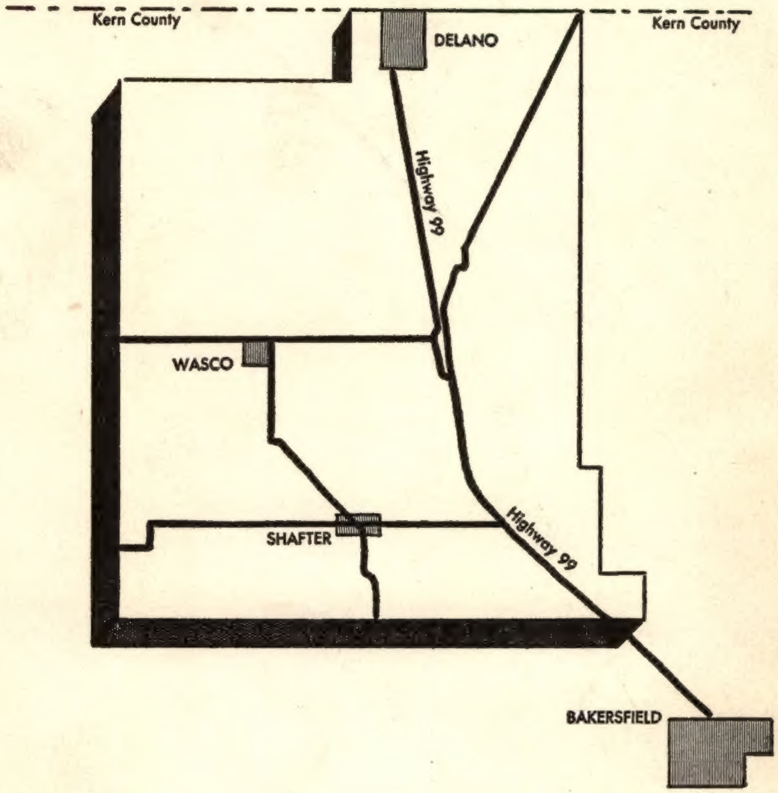
HD1761
G6
No. 143
c. 1

~~RESERVE~~ SEP 15 '53
~~MAY 10 '54~~
~~APR 10 '54~~
~~APR 20 '54~~
~~APR 22 '54~~
~~JUN 1 '54~~

A Publication of The College of Agriculture
UNIVERSITY OF CALIFORNIA

NORTHERN KERN COUNTY COTTON-POTATO FARMS



No. 2
OF A SERIES

COSTS, RETURNS, AND SCALE OF OPERATIONS

CHESTER O. McCORKLE, JR.

CALIFORNIA AGRICULTURAL EXPERIMENT STATION
GIANNINI FOUNDATION OF AGRICULTURAL ECONOMICS

Mimeographed Report No. 143 January 1953

UNIVERSITY OF CALIFORNIA
DAVIS
MAR 13 1953
LIBRARY

ACKNOWLEDGEMENTS

This investigation concerning farm organizations in Northern Kern County has been conducted cooperatively by the Giannini Foundation of Agricultural Economics, California Agricultural Experiment Station, and the United States Department of Agriculture, Bureau of Agricultural Economics.

Trimble R. Hedges, Associate Professor of Agricultural Economics, Associate Agricultural Economist in the Experiment Station and on the Giannini Foundation, University of California, College of Agriculture, Davis, assisted in the collection of field data and in some phases of the analysis. Warren R. Bailey and E. G. Strand, United States Department of Agriculture, Bureau of Agricultural Economics, and George W. Campbell, University of California, Davis, assisted in the collection of field data.

NORTHERN KERN COUNTY COTTON-POTATO FARMS

2. Costs, Returns, and Scale of Operation

Chester O. McCorkle, Jr.[1]

This publication is the second in a series dealing with the farm organization and administrative aspects of cotton-potato farming in Northern Kern County. The first was devoted primarily to a discussion of the purely physical characteristics of this type of farming.[2] It is the objective of this report to point out the influences of scale of operation on resource utilization, production costs and returns to farm operators. Emphasis is placed on the presentation of the physical origins of cost differentials associated with size and the impact of these cost differentials on total farm earnings. Basic physical and economic data including practices, physical inputs, yields, and unit costs of factors of production have been drawn from the first publication in this series.

The basic data for this study are taken from Production and Marketing Administration farm worksheets for 405 farms in the area and a field survey of 40 cotton-potato farms in Northern Kern County. Some analysis of these forty farms is included in this report but the bulk of the analysis is based on nine synthetic farm organizations representing three farm sizes and three organizations developed from the field survey farms. These nine farms are analyzed to determine (1) what scale economies arise in the application of specific resources such as labor, motive power, irrigation water, and equipment to the production of crops found on typical cotton-potato farms; (2) what are the "capacities" of these resources, or at what level of utilization can minimum operation costs be expected; and (3) how large are these savings as reflected in total farm budgets. No study of the sociological implications of the findings is included, though their importance is not denied.

---

[1] Chester O. McCorkle, Jr., is Instructor in Agricultural Economics, Junior Agricultural Economist in the Experiment Station, and Junior Agricultural Economist on the Giannini Foundation, University of California, College of Agriculture, Davis.

[2] Chester O. McCorkle, Jr. and Trimble R. Hedges, NORTHERN KERN COUNTY COTTON-POTATO FARMS--1. Organization, Inputs, and Costs, Calif. Agric. Exp. Station, Giannini Foundation of Agricultural Economics Mimeo. Report No. 137, (October 1952).

The nine farms include three sizes in each of three types of organization (Table 1). In Organization I the acreage of the three farms of 75, 150, and 300 crop acres respectively is divided equally between cotton, potatoes and alfalfa. The acreage of the three farms in Organization II is planted two-thirds to cotton, and one-sixth each to potatoes and alfalfa. Only cotton and potatoes are included in Organization III, the crop acreage in all three sizes being devoted two-thirds to cotton and one-third to potatoes. These three organizations are typical of those found in the area during the 1949-50 period.

Organization, Investment and Scale of Operations

During the 1949-50 crop year the two enterprises, cotton and potatoes, occupied over 75 per cent of the cropland on farms of all sizes in the area studied. On farms of less than 80 acres of cropland, these two crops utilized over 90 per cent of the land (Table 2).

As size of farm increases, the percentage of land devoted to cotton in the organization remains approximately fixed. The potato acreage in the organization, however, declines in relative importance. A 2 to 1 relationship of cotton to potatoes characterizes the organization for farms of 160 acres and below, with the exception of very small farms where concentration in either potatoes or cotton is typical. Beyond 160 acres, cotton continues to command about two-thirds of the cropland but other enterprises tend to gain in importance at the expense of the potato enterprise.

Physical and economic factors such as equipment capacities, water use, labor requirements, and conditions of contract operations dictate in large part the expansion of any given enterprise. Federal regulations pertaining to planted acreage and history establishment must not be underestimated as a determinant of expansion or contraction of specific enterprises in an area and on individual farms.

Adherence to the two primary cash crops by operators of small farms is indicative of the relative inflexibility in organization which is characteristic of the small operation. The operator is confined to those enterprises which bring in the greatest net return per unit of the limited resource, this being capital in the form of land in almost all cases. Labor, management, equipment and water resources frequently are available in excess quantities on small farms in this area and are consequently

TABLE 1

Enterprise Organization of Nine Synthetic Farms

FARM SIZE (crop acres)	Organization I				Organization II				Organization III	
	Cotton (acres)	Potatoes (acres)	Alfalfa (acres)		Cotton (acres)	Potatoes (acres)	Alfalfa (acres)		Cotton (acres)	Potatoes (acres)
75	25	25	25		50	12 1/2	12 1/2		50	25
150	50	50	50		100	25	25		100	50
300	100	100	100		200	50	50		200	100

TABLE 1

Enterprise Organization of Nine Synthetic Farms

FARM SIZE (crop acres)	Organization I				Organization II				Organization III	
	Cotton (acres)	Potatoes (acres)	Alfalfa (acres)		Cotton (acres)	Potatoes (acres)	Alfalfa (acres)		Cotton (acres)	Potatoes (acres)
75	25	25	25		50	12 1/2	12 1/2		50	25
150	50	50	50		100	25	25		100	50
300	100	100	100		200	50	50		200	100

TABLE 2

Organization Characteristics of 405 Cotton-Potato Farms in Northern Kern County, California, 1949

	Cotton		Potatoes	
	Average Acreage per Farm Reporting	Per cent of Cropland	Average Acreage per Farm Reporting	Per cent of Cropland
0- 29	10.1	57.4	8.1	46.0
30- 59	21.6	61.0	15.1	42.6
60- 89	44.5	65.8	20.5	30.3
90-119	53.8	57.4	28.8	30.7
120-149	75.1	62.8	35.0	29.3
150-179	107.0	71.5	30.3	20.2
180-239	132.8	69.1	54.1	18.1
240-299	162.2	67.3	58.8	24.4
300-399	197.1	65.2	86.5	28.6
400-499	301.2	77.5	62.4	16.1
500-699	340.6	64.3	166.6	31.4
700-999	397.8	53.3	184.5	24.7
1,000 and over	1,078.0	67.6	214.7	13.5

TABLE 2

Organization Characteristics of 405 Cotton-Potato Farms in Northern Kern County, California, 1949

	Cotton		Potatoes	
	Average Acreage per Farm Reporting	Per cent of Cropland	Average Acreage per Farm Reporting	Per cent of Cropland
0- 29	10.1	57.4	8.1	46.0
30- 59	21.6	61.0	15.1	42.6
60- 89	44.5	65.8	20.5	30.3
90-119	53.8	57.4	28.8	30.7
120-149	75.1	62.8	35.0	29.3
150-179	107.0	71.5	30.3	20.2
180-239	132.8	69.1	54.1	18.1
240-299	162.2	67.3	58.8	24.4
300-399	197.1	65.2	86.5	28.6
400-499	301.2	77.5	62.4	16.1
500-699	340.6	64.3	166.6	31.4
700-999	397.8	53.3	184.5	24.7
1,000 and over	1,078.0	67.6	214.7	13.5

used at less than the optimum rate. As farm size increases emphasis shifts to the problems of resource allocation and utilization as the capacities of specific resources are approached and the actual availability of such important resources as water and labor come into question. To meet these conditions the farm operator tends to diversify his organization adding enterprises which complement or supplement his primary income producers in labor, water, equipment and management resource utilization. Capital in the form of land still remains as a limiting factor to organization but its relative influence declines.

Enterprises frequently found on farms devoting the majority of their resources to cotton and potatoes are alfalfa, barley, milo, sugar beets, beans, onions, safflower, castor beans, and field corn. At least one of the three enterprises, alfalfa, barley, or milo, is included in the organization of farms of greater than 160 acres. Some 80-acre farms will produce alfalfa as a rotation crop but other alternatives are not commonly found. Milo is used as a double crop with potatoes particularly in years when losses on the potato enterprise are incurred. It is recognized that this practice taxes soil and water resources of the farm but in turn provides a means of recouping in-season losses.

Changes in farm size thus lead to changes in the organization of enterprises. But these organizational shifts are further assisted by the changing pattern of productive resources accompanying increases in scale of operation. More and/or larger tractors and matched equipment, more wells, increased labor forces, as well as increased acreage, which accompany an increase in scale result in variation in choice of practices, rates of accomplishment and quantity of inputs.

The operator of an 80-acre farm typically uses a wheel tractor of between 20 and 27 horsepower and corresponding equipment. In 1949, plowing with a 2-way plow was much more frequently observed on the 80-acre than the 160-acre farm. The 160-acre farm operator typically utilizes a tracklayer of between 25 and 30 horsepower and a smaller wheel tractor of between 15 and 20 horsepower. This difference in available motive power, and the equipment types and sizes which are then employed, introduces variation in rates of performance, utilization of the various resources, and in costs and returns. For example, chiseling with a tracklayer was a much more common means of land preparation on the 160-acre farm, plowing assuming a minor role. Chiseling on the 80-acre farm was confined to those

farms with adequate motive power to pull a chisel. Less variation in these factors is to be found between the 160 and 320-acre farms because the principal difference in resources employed is one of quantity of equipment rather than size of equipment. The 320-acre operator typically requires one 20 to 27 horsepower wheel tractor and corresponding equipment in addition to the motive power and implements found on the 160-acre farm. The tracklayers found on 160 and 320-acre farms are used primarily in seedbed preparation, disking, and chiseling. Potato planting and digging are also accomplished with tracklayers, though the digging is often contracted. Wheel tractors find their primary use in cultivating the row crops and performing the tasks of cutting and raking alfalfa when this enterprise is present in the organization.

Irrigation facilities prevalent on farms of each of the three sizes exhibit some variation in investments reflecting both the differences in depth to water and the operator's preference for rate of supply and evaluation of future underground water availability. The most typical well and pump installation on 80 acres delivers 900 gallons per minute. The pump output on 160-acre farms of this type usually approximates 1600 gallons per minute. The 320-acre farm irrigation system is customarily based on more than one well, each feeding into the underground system directly or indirectly through a farm reservoir. The total available water, regardless of the number of individual pumping plants and wells, is usually supplied at a rate of 3000 gallons per minute.

Farm buildings and other structures are a relatively unimportant resource in this production area because of the climatic conditions, enterprises, and marketing structures prevailing. A dwelling, tractor shed-farm shop combination structure, and in some instances an implement shelter, constitute the typical buildings. With the exception of shop facilities and tractor shelter needs, there is little need for increasing either size or number of buildings as farm size increases.

Labor inputs per unit of product vary more in source of labor than in quantity as farm size changes. The operator of the 80-acre farm represents the labor force on that size of farm with only occasional hired labor required at planting and harvesting time and some contracted labor during the cotton chopping season. On the 160-acre farm with the common enterprise organizations, one man is hired for a period varying

[illegible]

[illegible] up to 160 acres, but on the 240 and 320-acre farms [illegible] the principal difference in machinery employed is one of quantity of equipment rather than type of equipment. The 320-acre [illegible] [illegible] more tractor [illegible] and correspondingly [illegible] equipment. In addition to this, [illegible] more [illegible] implements [illegible] found on the 160-acre farms, [illegible] on 240 and 320-acre farms are used [illegible]

[illegible] with [illegible] though this [illegible] is often [illegible] that the [illegible] and [illegible] which [illegible] in [illegible] organizations.

Implement [illegible] representing forms of [illegible] in these plans [illegible] some [illegible] improvement [illegible] both the [illegible] and the [illegible] rate of [illegible] and [illegible] gallons per minute. [illegible] on more than one well, [illegible] the [illegible] was [illegible] of the [illegible] comparing [illegible] and well, [illegible] of 500 gallons per minute, [illegible]

[illegible] and other structures are [illegible] are [illegible] condition, [illegible] in some instances [illegible] implement [illegible] is [illegible] for [illegible]

[illegible] of [illegible] in [illegible] for the continued [illegible] during the [illegible] season. [illegible] -acre farm, [illegible] from seven to nine months, depending on the enterprise ratios in the organization. The 320-acre farm operator often spends the bulk of his time in a managerial capacity, hiring from one to four laborers during the growing season. Two nearly permanent employees must be supplemented during periods of heavy irrigation, cultivation, and planting times by one or two part-time workers. Beyond 320 acres some reduction in labor inputs per unit of output is anticipated as greater specialization can be introduced. However, an analysis of labor on farms of greater size becomes difficult because of the presence of vertical integration of the farm business, greater diversification, and the accompanying opportunities for shifting laborers to other than on-farm employment and to complementary and supplementary enterprises.

Variation in physical resources at the disposal of the operators of different farm sizes is in turn reflected in investment. Total investment increases as farm size increases. Per acre investment, however, declines with increasing scale on farms of the type found in this area. A comparison of investments on the 40 farms comprising the sample indicates that the average total investment on those farms classified as 80-acre farms was $51,200 as compared with $84,940 on the 160-acre farms. Per crop acre investments were $674 and $562 respectively (Table 3). Increasing farm size from 80 to 160 acres results in an increase in total investment of approximately 68 per cent. The least increase occurred in farm power units and machinery investment, indicating that about the same equipment is capable of farming the 160-acre farm that is necessary to operate the 80-acre farm.

The nine synthesized farms on which subsequent analysis is based exhibit comparable investment patterns (Table 4).[3] In this comparison, however, it is possible to evaluate the influence of organization as well as size on the level of investment. The resources included for each of the nine farms are those required to perform the production operations in the manner in which they are typically performed as determined in the farm survey. Farm Organizations I and II in each size group consist of cotton, potatoes and alfalfa and the investments in each size group for

---

[3] A complete inventory of land, buildings, irrigation systems, and equipment with investment values assigned for each of the nine farms is contained in Appendix Tables 1 through 3. Note that the farm dwelling is included in these tables, thus the totals vary slightly from those contained in Table 4.

[illegible] more months, depending [illegible] the season and the [illegible] of the enterprises. The 32-acre farm [illegible] of the time in operating [illegible], thirty-three [illegible] [illegible]. The use of [illegible] by [illegible] the central [illegible] of heavy investment, cultivation, [illegible] large-scale equipment. [illegible] acre farm [illegible] of output is sufficient as greatly [illegible] be [illegible]ed. However, an analysis [illegible] farms of [illegible] size [illegible] of the presence of [illegible] the farm business, greater diversification, and [illegible] opportunities for shifting labor to other than on-farm employment [illegible] supplementary [illegible].

Variation in physical resources [illegible] of the [illegible] farm sizes is in turn reflected in [illegible]. Total investment [illegible] in [illegible] farms of [illegible] of investments [illegible] farms considered [illegible] indicate that the [illegible] on [illegible] as [illegible] farms [illegible] $3,240 as compared with $21,940 on the 16-acre farm. [illegible] investments [illegible] (Table 3). Increasing farm size from 32 to 160 acres [illegible] in total investment of approximately 65 per cent. The least [illegible] farm size [illegible] very [illegible] equipment [illegible] 160-acre farm.

The nine synthesized farms on which subsequent analysis [illegible] [3] [illegible] however, it is possible to evaluate the [illegible] of [illegible] at [illegible] the level of investment. [illegible] for each of the [illegible] resources [illegible] in the manner in which they are [illegible] to the farm [illegible]. Farm [illegible] 1 and 7 [illegible] of [illegible], potatoes and [illegible] and the investments [illegible]

---

[3] [illegible]

TABLE 3

Comparative Capital Investments with Percentage Changes by Groups on 80 and 160-Acre Cotton-Potato Farms in Northern Kern County, 1949

Farm Size (acres)	Land	Buildings	Wells, Pumps, and Irrigation Systems	Farm Power Units and Machinery	Total Investment	Average Crop Acres	Investment per Crop Acre
80	$24,798	$5,815	$11,608	$ 8,979	$51,200	76.0	$674
160	47,984	6,815	19,024	11,117	84,940	151.3	562
+100%	+93.5%	+17.2%	+63.9%	+23.8%	+65.9%	+99.1%	-16.6%

Sources: (1) Farm interview data from 40 sample farms.
(2) Appraisal Department, Bank of America, Bakersfield, California.

TABLE 3

Comparative Capital Investments with Percentage Changes by Groups on 80 and 160-Acre Cotton-Potato Farms in Northern Kern County, 1949

Farm Size (acres)	Land	Buildings	Wells, Pumps, and Irrigation Systems	Farm Power Units and Machinery	Total Investment	Average Crop Acres	Investment per Crop Acre
80	$24,798	$5,815	$11,608	$ 8,979	$51,200	76.0	$674
160	47,984	6,815	19,024	11,117	84,940	151.3	562
+100%	+93.5%	+17.2%	+63.9%	+23.8%	+65.9%	+99.1%	-16.6%

Sources: (1) Farm interview data from 40 sample farms.
(2) Appraisal Department, Bank of America, Bakersfield, California.

TABLE 4

Comparative Investments in Land, Farm Buildings, Tractors, Farm Equipment and Irrigation Facilities on Three Farm Sizes and Three Organizations 1/

Investment Items	Farm Size and Enterprise Organization					
	80 Acres		160 Acres		320 Acres	
	I and II	III	I and II	III	I and II	III
Land	$24,000	$24,000	$48,000	$48,000	$96,000	$96,000
Farm Buildings	1,315	1,315	2,315	2,315	3,150	3,150
Tractors	2,490	2,490	4,475	4,475	6,965	6,965
Farm Equipment	3,186	2,691	3,065	2,570	3,946	3,451
Irrigation Facilities	10,504	10,504	18,737	18,737	35,059	35,059
TOTAL	$41,495	$41,495	$76,592	$76,097	$145,120	$144,625
Per Acre of Cropland	$ 553	$ 547	$ 511	$ 507	$ 484	$ 482

1/ Less farm dwelling but including farm shop as part of tractor shed.

TABLE 4

Comparative Investments in Land, Farm Buildings, Tractors, Farm Equipment and Irrigation Facilities on Three Farm Sizes and Three Organizations 1/

Investment Items	Farm Size and Enterprise Organization					
	80 Acres		160 Acres		320 Acres	
	I and II	III	I and II	III	I and II	III
Land	$24,000	$24,000	$48,000	$48,000	$96,000	$96,000
Farm Buildings	1,315	1,315	2,315	2,315	3,150	3,150
Tractors	2,490	2,490	4,475	4,475	6,965	6,965
Farm Equipment	3,186	2,691	3,065	2,570	3,946	3,451
Irrigation Facilities	10,504	10,504	18,737	18,737	35,059	35,059
TOTAL	$41,495	$41,495	$76,592	$76,097	$145,120	$144,625
Per Acre of Cropland	$ 553	$ 547	$ 511	$ 507	$ 484	$ 482

1/ Less farm dwelling but including farm shop as part of tractor shed.

the two organizations are identical. Farm Organization III without alfalfa shows a small decline in investment reflecting the absence of haying equipment in the machinery inventory. Investment per acre of cropland declines with increasing scale of operations as before but the rate of decline is reduced as a result of limiting the resources included in each size group to those actually required. The survey revealed that small farmers typically had greater farm power and machinery inventories, and in a few instances larger irrigation pumping plants, than were required to perform the typical operations.

Resource Utilization, Operating Costs and Scale of Operation

The extent to which the physical resources available to the operator of a given farm are utilized determines in large part the cost of these factors on a per unit of input basis. To illustrate the relationship between utilization, cost and scale of operation, the resources on the nine synthetic farms are analyzed. Strict comparability in organization and size has permitted a separation of the effects of scale and organization on utilization and cost.

Farm Tractors.--The computed costs for tractor power on the three sizes of farms and three organizations provide a comparison of size and organization influences on scale (Table 5).[4] Consider first the net relationship between organization and cost, holding farm size fixed. Costs per hour of operation for the W-3 tractor on the 80-acre farm decline as the enterprise organization includes more cotton and potatoes at the expense of alfalfa, thus increasing annual use of the tractor. Annual use in hours increases from 441 hours to 525 hours while the proportion of alfalfa in the organization declines from one-third to zero. Further increase in annual use would occur if more of the alfalfa acreage were diverted into cotton rather than potatoes because the per acre motive power requirements are greater for cotton than potatoes. The increase in annual use from 441 hours to 525 hours associated strictly with organization changes results in a decline in per hour operating cost from $1.54 to $1.38. Similar comparisons of organization influence on tractor operating costs can be drawn.

---

[4] Appendix Tables 4-6 present costs for each tractor on each farm by component parts including overhead, fuel, oil and lubricants, repairs and servicing. Annual total and per hour rates are included for each cost component.

TABLE 5

Total Annual, Per Acre, and Per Hour Tractor Operating Costs on Nine Farms

Organization and Farm Size	W-2			W-3			DT-3			Total Annual Tractor Cost	Total Annual Tractor Cost per Ac.
	Total Annual Cost	Hours Oper-ated	Cost per Hour Operated	Total Annual Cost	Hours Oper-ated	Cost per Hour Operated	Total Annual Cost	Hours Oper-ated	Cost per Hour Operated		
Organization I											
	$		$	$		$	$		$	$	$
80 Acres	--	--	--	678.30	441	1.54	--	--	--	678.30	8.48
160 Acres	490.76	651	.75	--	--	--	574.99	220	2.61	1,065.75	6.66
320 Acres	633.81	959	.66	625.77	418	1.50	598.48	287	2.09	1,858.06	5.81
Organization II											
80 Acres	--	--	--	721.54	520.5	1.39	--	--	--	721.54	9.02
160 Acres	545.86	798.5	.68	--	--	--	578.54	230	2.52	1,124.40	7.03
320 Acres	662.97	1112	.60	740.85	646	1.15	571.51	210	2.72	1,975.33	6.17
Organization III											
80 Acres	--	--	--	724.01	525	1.38	--	--	--	724.01	9.05
160 Acres	522.32	735	.71	--	--	--	602.96	300	2.01	1,125.28	7.03
320 Acres	593.92	927	.64	747.79	660	1.13	626.42	367	1.71	1,968.13	6.15

Means of comparing size and cost relationships are less easily devised because the physical output of tractors of various types and sizes does not vary in strict proportion to cost. For example, the output of a DT-3 tracklayer per dollar of cost is different in quantity and quality from that of a W-3, even when the horsepower ratings of the two tractors may be identical. For this reason, per hour operating costs of "tractor power" for the farm as a whole are not valid comparisons. Tractor costs per acre, while less precise than per hour costs, do provide a basis for comparison. With enterprise ratios fixed in any of the three patterns, per acre tractor costs exhibit significant declines as size increases (Figure 1). An average reduction for the three organizations of 22 per cent in per acre costs of operating tractors accompanies the increase in size from 80 to 160 acres (75 to 150 crop acres). Increasing the size from 160 to 320 acres (150 to 300 crop acres) results in an average reduction of approximately 13 per cent.

Whether resulting from a shift in organization or size, in all cases the lowered costs reflect greater annual utilization. To illustrate more clearly the net relation of size to cost, the Organization I enterprise ratio of one-third cotton, alfalfa and potatoes has been applied to a series of farm sizes from 50 to 120 crop acres and the tractor costs per hour of operation for a W-3 tractor computed (Table 6 and Figure 2). Per hour operating costs continue to decline as farm size increases but at a decreasing rate. On the 50 crop-acre farm with an annual utilization of 294 hours, the cost per hour was $2.03 as compared with $1.17 per hour for the 120 crop-acre farm when the annual use is 705.6 hours. The per hour decrease per crop acre data indicates the rate of decrease in declining costs per hour. The apparent constancy in per hour decrease per crop acre occurring over short ranges in size is because of the discontinuity in the data rather than any inherent characteristic of the size-cost relationship.

A similar analysis for a DT-3 tractor on Organization II (two-thirds cotton, one-sixth alfalfa, and one-sixth potatoes) with work proportioned among three tractors as on the 320-acre farm, illustrates the relationship between size of farm, annual utilization, and cost per hour of operation (Table 7 and Figure 3). The decline from $3.91 per hour for 140 hours of use per year on the 200 crop-acre farm to $2.13 per hour for 280 hours of use on the 400 crop-acre farm represents a cost decrease of 46 per cent

Costs of operating, size, and cost relationships are less easily devised because the physical output of tractors of various types and sizes does not vary in direct proportion to cost. For example, the output of a TD-9 [illegible] per dollar of cost is different in quantity and quality from that of a D-5, even when the horsepower ratings of the two tractors may be identical. For this reason, per hour operating costs or "per acre" for the farms as a whole are not valid [illegible].

[illegible] a basis for comparison. With enterprise ratios fixed in any of the three [illegible], per hour tractor costs exhibit significant declines as size increases (Figure 1). An average reduction for the three organizations of 22 per cent in per hour costs of operating tractors [illegible] the increase in size from 80 to 160 acres (75 to 150 crop acres). Increasing the size from 160 to 320 acres (150 to 300 crop acres) [illegible] average reduction of approximately 15 per cent.

[illegible] size, in [illegible] more clearly the net relation of size to cost, the Organization I enterprise ratios of [illegible] cotton, [illegible] and [illegible] have been applied to a series of farm sizes from 80 to 320 crop acres and [illegible] per hour of operation for a W-9 tractor computed (Table 6 and Figure 2). [illegible] operating costs continue to decline as farm size [illegible] at a decreasing rate. On the 80 crop-acre farm with an [illegible] of 394 hours, the cost per hour was $2.03 as compared with $1.17 per hour for the 320 crop-acre farm where the annual use was 1,136 hours. [illegible] indicates the rate of decrease in [illegible] costs per hour. The apparent irregularity in [illegible] between sizes [illegible] in size is because of the discontinuity in the data rather than any inherent characteristic in [illegible].

A similar analysis for a TD-9 tractor on Organization II conditions [illegible] which shows the [illegible] as on the 320-acre farm, illustrates the relationship between size of farm, annual [illegible], and cost per hour of operation (Table 7 and Figure 3). The [illegible] from $3.91 per hour for 120 hours of use per year on the [illegible] to $2.13 per hour for 560 hours of use on the [illegible] acre farm. This represents a cost decrease of 46 per cent

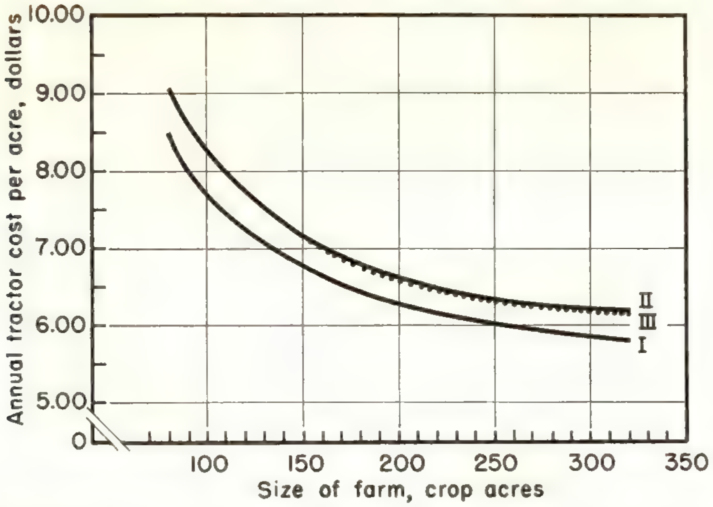


Figure 1. Relationship of Total Annual Tractor Costs Per Acre to Size of Farm for Three Organizations.

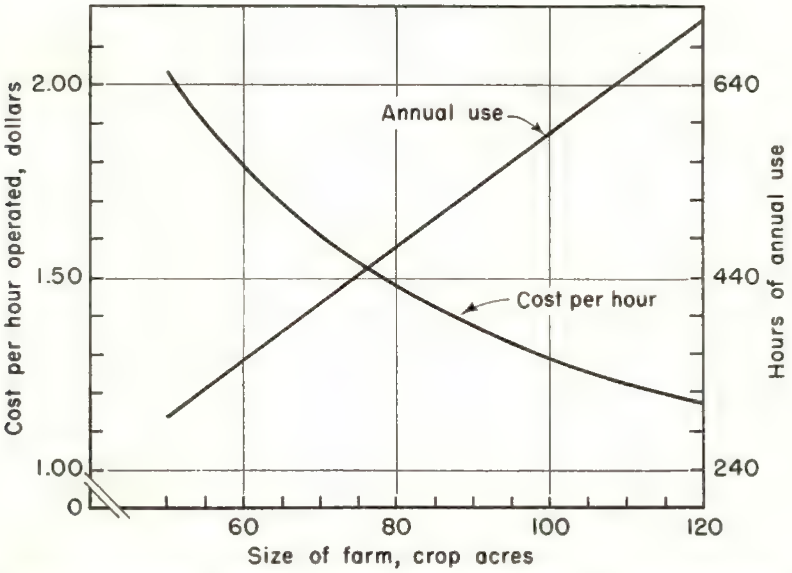


Figure 2. Relationship between Hours of Annual Use and Cost Per Hour of Operation for W-3 Tractors on Farms of Selected Sizes and Given Organization.

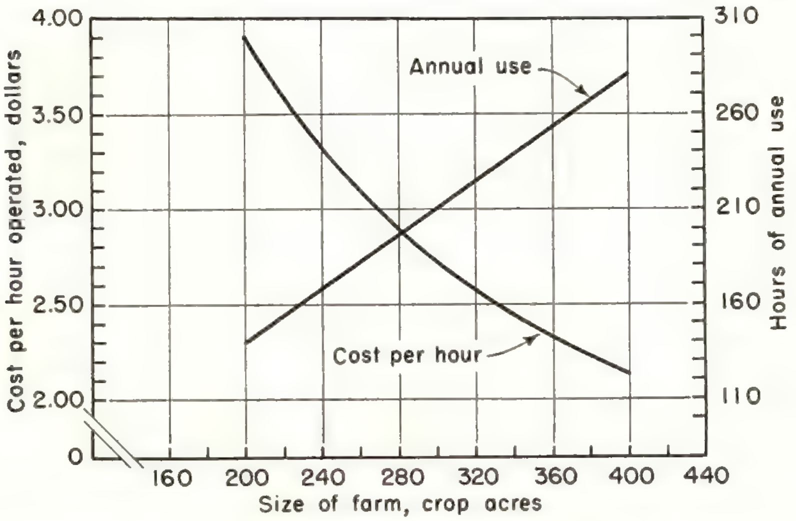


Figure 3. Relationship between Hours of Annual Use and Cost Per Hour of Operation for DT-3 Tractors on Farms of Selected Sizes and Given Organization.

TABLE 6

Utilization and Operating Costs for W-3 Tractors on Farms of Selected Sizes and Given Organization a/

Size of Farm in Crop Acres	Annual Total Cost	Hours Operated	Cost Per Hour Operated	Per Hour Decrease Per Crop Acre
50	$ 598.01	294.0	$ 2.03	$ --
55	614.04	323.4	1.90	.026
60	630.11	352.8	1.79	.022
65	646.18	382.2	1.69	.020
70	662.21	411.6	1.61	.016
75	678.30	441.0	1.54	.014
80	694.50	470.4	1.48	.012
85	710.24	499.8	1.42	.012
90	726.45	529.2	1.37	.010
95	742.24	558.6	1.33	.008
100	758.56	588.0	1.29	.008
105	774.62	617.4	1.25	.008
110	790.70	646.8	1.22	.006
115	806.72	676.2	1.19	.006
120	822.80	705.6	1.17	.004

a/ The acreage on each farm is divided equally between cotton, potatoes, and alfalfa, irrespective of farm size (Organization I).

TABLE 7

Utilization and Operating Costs for DT-3 Tractors on Farms of Selected Sizes and Given Organization a/

Size of Farm in Crop Acres	Annual Total Cost	Hours Operated	Cost Per Hour Operated	Per Hour Decrease Per Crop Acre
200	$ 547.08	140	$ 3.91	$ --
210	549.50	147	3.74	.017
220	551.99	154	3.58	.016
230	554.43	161	3.44	.014
240	556.89	168	3.31	.013
250	559.31	175	3.20	.011
260	561.77	182	3.09	.011
270	564.22	189	2.99	.010
280	566.68	196	2.89	.010
290	569.12	203	2.80	.009
300	571.54	210	2.72	.008
310	574.00	217	2.64	.008
320	576.45	224	2.57	.007
330	578.91	231	2.50	.007
340	581.33	238	2.44	.006
350	583.78	245	2.38	.006
360	586.23	252	2.32	.006
370	588.68	259	2.27	.005
380	591.12	266	2.22	.005
390	593.55	273	2.17	.005
400	596.01	280	2.13	.004

a/ Acreage on each farm, irrespective of size, is allocated in the following manner: cotton, two-thirds; alfalfa, one-sixth; potatoes, one-sixth (Organization II).

accompanying a two-fold increase in farm size. Again the decreasing rate of cost reduction as size increases is apparent in these data.

Farm Equipment.--Similar illustrations of the influence of size and organization on operating costs can be derived from the data on equipment use and cost for each of the nine farms. Annual equipment costs vary more with changes in organization within the size group studied but per acre equipment costs vary significantly with size of farm (Table 8).[5]

TABLE 8

Annual Total and Per Acre Equipment Costs on Nine Farms

Organization and Farm Size	Total Cost	
	Per Year	Per Acre
Organization I		
80 Acres	$ 423.50	$ 5.29
160 Acres	416.26	2.60
320 Acres	526.51	1.65
Organization II		
80 Acres	423.68	5.30
160 Acres	416.55	2.60
320 Acres	526.51	1.65
Organization III		
80 Acres	355.68	4.45
160 Acres	347.45	2.17
320 Acres	453.00	1.42

While indicating that total equipment costs vary only slightly with changes in size and moderately with organizational variation this table lacks the desired detail to show relations between size of farm, annual use and cost per hour of operation. Therefore, the utilization of two specific pieces of farm equipment has been analyzed for a given organization and range of farm sizes (Table 9 and Figure 4). These equipment items are included in the equipment inventory of each of the nine farms and represent large expense items relative to other farm machinery employed. The rapid rate of decline in per hour operating costs as farm size increases in the initial stages indicates the importance of matching farm size and equipment

---

[5] Appendix Tables 7-9 contain total annual cost, total annual hours of use and cost per hour of operation for each of the nineteen implements commonly used in this type of farming with prevailing technical production practices.

TABLE 9

Costs of Operating 4-Row Lister Planters and 2-Row Potato Planters with Fertilizer Attachment on Farms of Selected Sizes and Given Organization a/

Size of Farm in Crop Acres	4-Row Lister Planter				2-Row Potato Planter and Fertilizer Attach.			
	Yearly Total Cost	Hours Operated	Cost per Hour Operated	Per Hour Decrease Per Crop Acre	Yearly Total Cost	Hours Operated	Cost per Hour Operated	Per Hour Decrease Per Crop Acre
50	$53.05	10	$5.30	-	$74.65	9.0	$8.29	-
75	53.76	15	3.58	$ .0688	75.65	13.6	5.56	$ .1092
100	54.47	20	2.72	.0344	76.65	18.2	4.21	.0540
125	55.18	25	2.21	.0204	77.65	23.8	3.26	.0380
150	55.89	30	1.86	.0140	78.65	27.4	2.87	.0156
175	56.60	35	1.62	.0096	79.65	32.0	2.49	.0152
200	57.31	40	1.43	.0076	80.65	36.6	2.20	.0116
225	58.02	45	1.29	.0056	81.65	41.2	1.98	.0088
250	58.73	50	1.17	.0048	82.65	45.8	1.80	.0072
275	59.44	55	1.08	.0036	83.65	50.4	1.66	.0056
300	60.15	60	1.00	.0032	84.65	55.0	1.54	.0048
325	60.86	65	.94	.0024	85.65	59.6	1.44	.0040
350	61.57	70	.88	.0024	86.65	64.2	1.35	.0036

a/ Acreage on each farm allocated as follows: cotton, two-thirds; alfalfa, one-third; potatoes, one-third (Organization II).

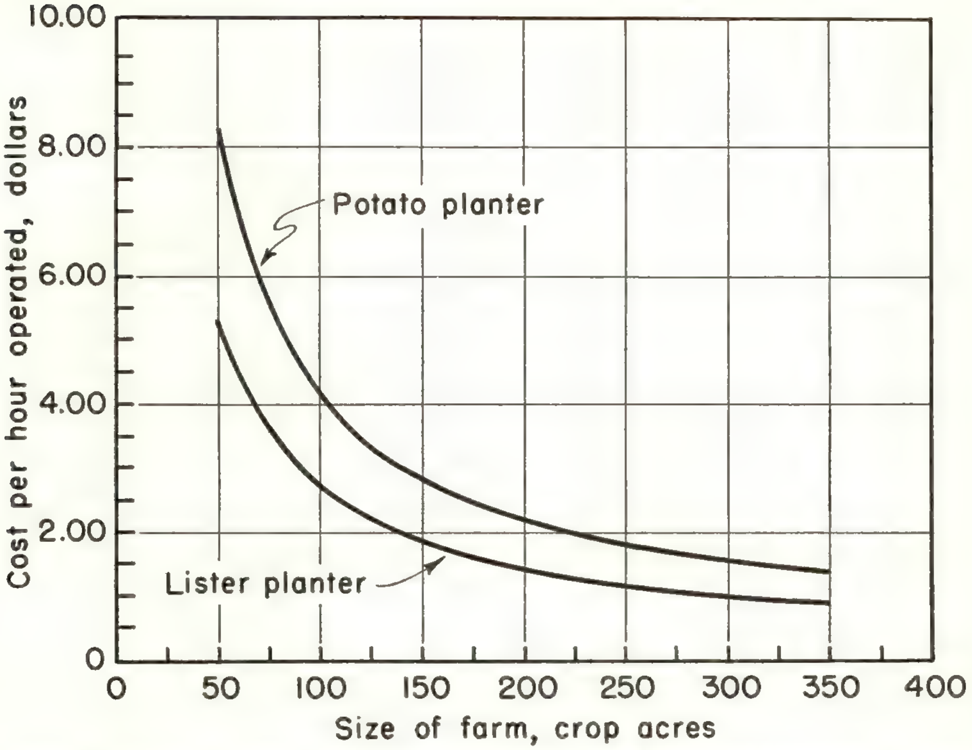


Figure 4. Relationship between Cost of Operation of 4-Row Lister Planters and 2-Row Potato Planters on Farms of Selected Sizes and Given Organization.

capacity if operating costs are to approach optimum level. Where such equipment is essential to the production process regardless of size of farm, operators of small farms must be prepared to meet heavy equipment operating expenses, arrange for joint ownership or contract its services.

Irrigation Equipment.--Irrigation equipment costs include those costs incurred in pumping and distributing water on the farm. Overhead costs must include overhead on the underground distribution system in addition to the well and pump. Power, lubricants, and repair costs are incurred by the pump primarily, though some repair expense may arise with the well and distribution system.

Costs per acre foot of water pumped and delivered decline as farm size increases for any given organization. These costs also decline with any change in organization which expands enterprises which consume greater quantities of water relative to the previous organization, though the size-cost relationship appears more pronounced within the common range of alternative organizations (Table 10 and Figure 5). For example, an increase in farm size from 80 to 320 acres with an organization of one-third alfalfa results in a decline in water cost per acre foot from $7.41 to $6.35.[6] By varying the organization from that above so that the alfalfa acreage on the 80-acre farm is diverted entirely to cotton, water costs increase from $7.41 to $8.45. These data illustrate the net effect of scale and organization on per unit water costs. The graphic presentation (Figure 5) further indicates the net relationship of size, organization, utilization and cost. Again the reduction in overhead costs per unit of output represents the greatest source of saving as utilization of the facilities is increased whether from size increase or organization variation.

An analysis of costs of farm pumping plants and underground irrigation systems associated with different farm sizes (where the differences in farm size are measured in small increments) serves to illustrate the influence of indivisibility of resources on costs. Two characteristics of the use of irrigation resources and their effects on costs are: (1) the per acre foot cost of delivering water ordinarily declines as farm size increases, regardless of what pumping plant is used in the

---

6/ Alfalfa requires approximately twice the water needed by cotton and nearly three times that applied to potatoes.

TABLE 10

Costs of Irrigation Water Pumped and Delivered for Three Organizations and Three Farm Sizes

Cost Items	80 Acres		160 Acres		320 Acres	
	Total Cost	Cost per Ac. Foot	Total Cost	Cost per Ac. Foot	Total Cost	Cost per Ac. Foot
	$	$	$	$	$	$
Organization I						
Overhead	809.41	2.95	1,418.19	2.58	2,643.07	2.41
Power	1,034.02	3.77	1,923.98	3.51	3,669.81	3.34
Oil and Grease	46.20	.17	83.16	.15	155.26	.14
Repairs	143.90	.52	266.89	.49	508.69	.46
Total	2,033.53	7.41	3,692.22	6.73	6,976.83	6.35
Total Acre Feet Pumped		274.5		549.0		1,098.0
Organization II						
Overhead	809.41	3.15	1,418.19	2.76	2,643.07	2.57
Power	994.80	3.87	1,855.29	3.60	3,547.22	3.45
Oil and Grease	43.30	.17	77.96	.15	145.53	.14
Repairs	134.86	.52	250.12	.49	476.71	.46
Total	1,982.37	7.71	3,601.56	7.00	6,812.53	6.62
Total Acre Feet Pumped		257.25		514.5		1,029.0
Organization III						
Overhead	809.41	3.64	1,418.19	3.18	2,643.07	2.97
Power	915.80	4.12	1,716.51	3.86	3,293.99	3.71
Oil and Grease	37.45	.17	67.42	.15	125.86	.14
Repairs	116.65	.52	216.34	.49	412.31	.46
Total	1,879.31	8.45	3,418.46	7.68	6,475.23	7.28
Total Acre Feet Pumped		222.5		445.0		890.0

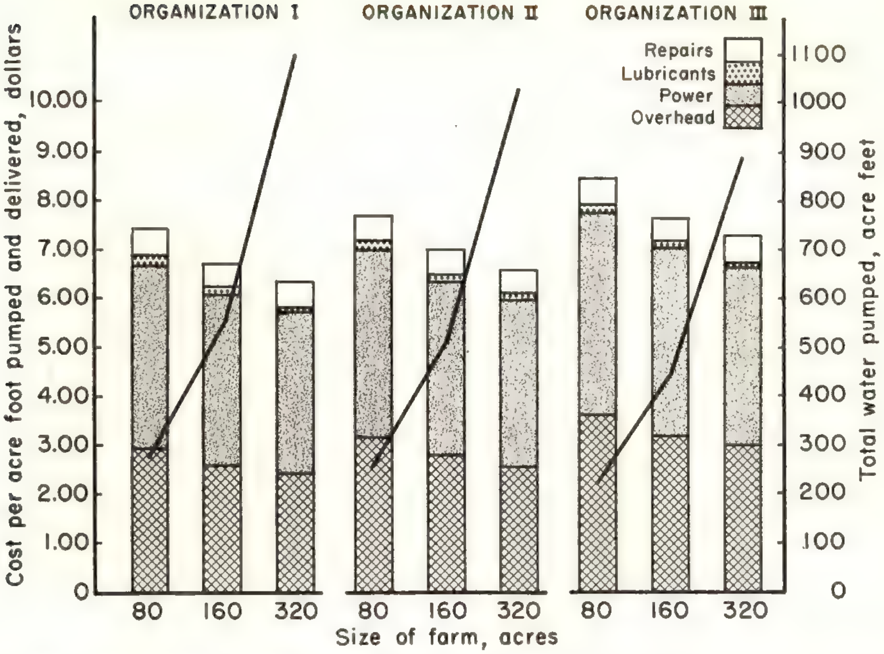


Figure 5. Relationships between Irrigation Water Costs and Total Acre Feet of Water Pumped on Nine Farms.

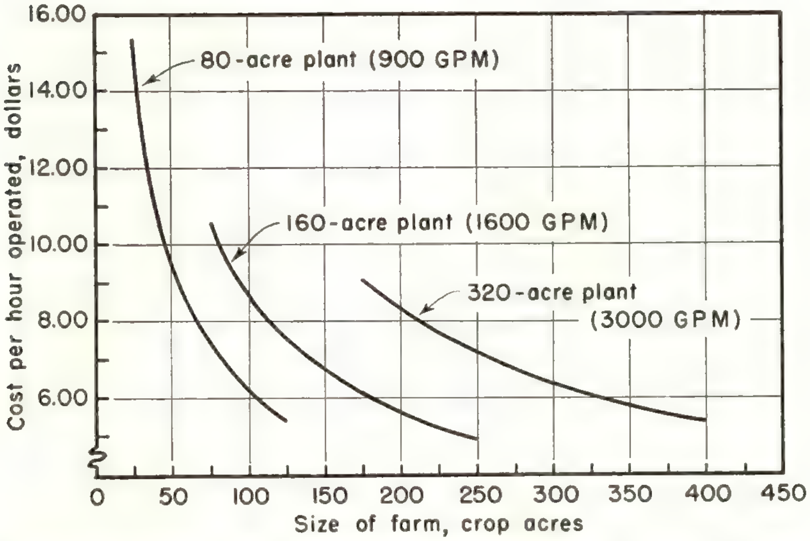


Figure 6. Relationship between Size of Farm and Cost of Pumping and Delivering Irrigation Water with Three Plants and Selected Organization.

organization, and (2) the per acre foot costs of water for a farm of given size and organization serviceable by two or more plants of varying sizes may vary significantly depending on which plant is used. These characteristics are exhibited by all resources which are not obtainable in small divisible units.[7/] Often there is physical necessity for adding a larger pumping plant before the smaller pumping plant's capacity has been reached. But as scale of operation increases the operating cost of the larger plant usually falls below the minimum for the previous plant if size of farm increases sufficiently to permit near optimum rate of utilization.

This relationship between water costs and annual use of different sizes of irrigation equipment can be illustrated with water costs from the three sizes of pumping plants (Table 11 and Figure 6). The enterprise ratios are fixed as in Organization I. Farm size is varied over a range where substitutability between plants is both physically feasible and representative of actual substitutions which have been found. In each case costs per acre foot decline as farm size increases but at a decreasing rate. The rate of decline in cost as farm size increases indicates the range of farm sizes on which the cost of water when delivered by given plants would be considered economical given the cost and price levels. For example, the 80-acre plant will deliver water at a cost which declines relatively rapidly as farm size is increased to the maximum serviceable by that plant size. At the other extreme, the cost of water from the 320-acre plant exhibits a relatively slow rate of decline over a wide range of farm sizes.

The particular set of wells and pumps chosen to deliver the total output of water for each of the three sizes influences markedly the level of the cost functions (Figure 6). Since two pumps, one of 700 GPM and the other 900 GPM output, were used on the 160-acre farms the water cost would differ from that based on a single pumping plant delivering 1,600 GPM. On the 320-acre farm where four plants were used, it is probable that a higher cost per acre foot for water prevails than if two 1,500 GPM plants had been used.

[7/] Costs per unit may remain constant or increase with increased use where conditions of constant or decreasing returns to scale prevail but decreasing costs per unit are typical for production resources on the farms studied.

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

TABLE 11

Cost of Pumping and Delivering Irrigation Water on Farms of Selected Sizes with Comparable Organization with Three Sizes of Pumping Plants a/

Size of Farm in Crop Acres	80 Acre Plant (900 GPM)		160 Acre Plant (1600 GPM)		320 Acre Plant (3000 GPM)	
	Annual Total Cost	Cost per Acre Foot Pumped	Annual Total Cost	Cost per Acre Foot Pumped	Annual Total Cost	Cost per Acre Foot Pumped
25	$1,409.62	$ 15.41	$	$	$	$
50	1,762.09	9.63				
75	2,033.53	7.41	2,912.44	10.61		
100	2,272.61	6.21	3,188.37	8.71		
125	2,470.94	5.40	3,451.65	7.54		
150			3,692.22	6.73		
175			3,905.02	6.10	5,810.78	9.07
200			4,104.47	5.61	6,074.17	8.30
225			4,303.92	5.22	6,337.58	7.70
250			4,503.37	4.92	6,565.81	7.18
275					6,787.85	6.74
300					6,976.83	6.35
325					7,176.97	6.03
350					7,377.12	5.76
375					7,577.27	5.52
400					7,777.41	5.31

a/ Organizations consist of one-third cotton, one-third potatoes, and one-third alfalfa.

No evidence of increasing per acre foot costs for water as size continues to increase with a given plant is available. On no farm studied were pumping plants so small in relation to farm size that increasing costs arose because of excessive utilization. Nor was there evidence of decreased returns from lower yields directly traceable to insufficient water inputs. Rather, larger plants than physically required under present conditions of water availability were commonly found, which led to higher costs resulting from inadequate annual use.

Unit Production Costs and Scale of Operation

Differences in net production costs associated with farm size may originate in physical production practices, in utilization of factors of production, in factor purchasing advantages or any combination of the three. Variations in practices and factor utilization on farms of different scale have been discussed previously. Sources of advantage in the purchase of factors of production were presented in the first publication in this series.[8/]

Production costs for cotton and potatoes based on 1949 cost-price data have been computed for each of the nine farms. Alfalfa production costs have been computed for each farm in the first two organizations but were not included in the third organization (Tables 12 through 14).[9/] Prices of inputs as established in previous analysis are applied to units of inputs on a per acre basis to ascertain the total cost per acre. Cost per unit of output is obtained by dividing the per acre yield into per acre cost. The summary cost tables contain only group totals. The six groups are labor, contracted and piece work, motive power, farm equipment, materials and miscellaneous.

The costs shown represent direct and indirect expenses of production assuming that there are no idle resources on each of the farms. This

---

8/ Giannini Foundation of Agricultural Economics Mimeo. Report No. 137

9/ Appendix Tables 10 through 17 contain detailed production costs for each farm and enterprise. Slight variation between costs in these tables and those appearing in Mimeo. Report No. 137 arise from changes in farm enterprise organization and therefore in annual utilization. Rates for purchased factors such as tractor fuel, repairs, labor, etc. remain unchanged.

No evidence of increasing [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] were competing plants so small in relation to them that their weight [illegible] of [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] plants [illegible] [illegible] [illegible] [illegible] of water availability were correctly known, [illegible] [illegible] [illegible] doubling [illegible].

[illegible] of [illegible]

[illegible] in [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible], in addition [illegible] [illegible] [illegible] [illegible] [illegible] and [illegible] of different [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] of [illegible] [illegible] [illegible] [illegible] [illegible].

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] (Table [illegible]) [illegible].

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

TABLE 12

Comparative Costs of Producing Cotton Per Acre and Per Bale on Nine Farms with Selected Organization, 1949 Costs and Prices

Cost Groups	Farms								
	Organization I			Organization II			Organization III		
	80 Acres	160 Acres	320 Acres	80 Acres	160 Acres	320 Acres	80 Acres	160 Acres	320 Acres
Labor	$ 19.04	$ 17.02	$ 16.42	$ 19.04	$ 17.02	$ 16.62	$ 19.04	$ 17.02	$ 16.52
Contracted and Piece Work a/	135.64	135.64	135.64	135.64	135.64	135.64	135.64	135.64	135.64
Motive Power	13.52	9.95	9.25	12.32	9.36	8.74	12.24	8.74	7.81
Farm Equipment	8.99	4.45	3.14	5.35	2.59	1.77	4.98	2.43	1.63
Materials	37.42	35.25	34.03	38.38	36.11	34.89	40.75	38.29	37.01
Miscellaneous	21.26	21.37	21.41	21.26	21.37	21.41	21.26	21.38	21.42
Total Cost Per Acre	235.87	223.68	219.89	231.99	222.09	219.07	233.91	223.50	220.03
Total Cost Per Bale (Yield 2.1 bales)	112.32	106.51	104.71	110.47	105.76	104.32	111.39	106.43	104.78

a/ Includes picking and ginning.

TABLE 13

Comparative Costs of Producing Potatoes Per Acre and Per Bale on Nine Farms
with Selected Organization, 1949 Costs and Prices

Cost Groups	Farms								
	Organization I			Organization II			Organization III		
	80 Acres	160 Acres	320 Acres	80 Acres	160 Acres	320 Acres	80 Acres	160 Acres	320 Acres
Labor	$ 13.32	$ 12.74	$ 12.48	$ 13.32	$ 12.74	$ 12.46	$ 13.32	$ 12.74	$ 12.64
Contracted and Piece Work a/	233.30	233.30	233.30	233.30	233.30	233.30	233.30	233.30	233.30
Motive Power	7.70	8.89	6.92	6.95	8.49	5.30	6.90	7.12	5.68
Farm Equipment	6.65	3.23	1.88	9.87	4.94	2.79	5.69	2.79	1.59
Materials	159.10	157.40	156.46	159.86	158.08	157.13	161.70	159.78	158.78
Miscellaneous	21.28	21.36	21.35	21.27	21.35	21.34	21.28	21.36	21.35
Total Cost Per Acre	441.35	436.92	432.39	444.57	438.90	432.32	442.19	437.09	433.34
Total Cost Per Cwt. (Yield 290 Cwt.)	1.52	1.51	1.49	1.53	1.51	1.49	1.52	1.51	1.49

a/ Including shed costs.

TABLE 14

Comparative Costs of Producing Alfalfa Per Acre and Per Bale on Six Farms with Selected Organization, 1949 Costs and Prices

Cost Groups	Farms					
	Organization I			Organization II		
	80 Acres	160 Acres	320 Acres	80 Acres	160 Acres	320 Acres
Labor	$ 9.40	$ 9.16	$ 8.98	$ 9.40	$ 9.16	$ 9.18
Contracted and Piece Work a/	41.23	41.23	41.23	41.23	41.23	41.23
Motive Power	7.08	3.45	3.22	6.39	3.13	2.92
Farm Equipment	2.65	1.36	.71	5.28	2.70	1.49
Materials	39.12	35.53	33.53	40.71	36.96	34.95
Miscellaneous	30.33	30.32	29.31	30.16	30.39	30.14
Total Cost Per Acre	129.81	121.05	116.98	133.17	123.57	119.91
Total Cost Per Ton (Yield 8 1/2 Tons)	15.27	14.24	13.76	15.67	14.54	14.11

a/ Includes baling and roadsiding.

assumption is warranted for resources on the farm sizes and organizations considered, with the exception of the 80-acre farm where the farm operator may not be fully employed. Where his time is not fully utilized, the cost data presented tend to understate the actual cost advantages accruing to larger scales of operation. Indirect labor costs, in contrast to direct labor expenses, would be greater on the smaller farms than are shown in these tables. This assumption is relaxed in the final section when total farm earnings are considered.

Both scale of operations and organization influence the level of cotton production costs, though the impact of scale is more pronounced (Table 12). A reduction of approximately $5.00 per bale accompanies an increase in scale from 80 to 160 acres for any of the three organizations. With Organization I the reduction is $5.81, $4.71 with Organization II and $4.96 with Organization III. Comparing the 80-acre organizations with those of 320 acres, the reductions are $7.61, $6.15, and $6.61 respectively for Organizations I through III. The major reduction occurs as size increases from 80 to 160 acres indicating that the 160 acre unit is of adequate size to make efficient use of motive power, farm equipment, and other resources which are to varying degrees indivisible. The differences do not appear large but for the entire production of cotton the savings are sizeable. For example, the 50 acres of cotton on the 80-acre farm in Organization III is produced for a total cost of $11,695.50--while 50 acres on the 320-acre farm of the same organization cost only $11,001.50, a saving of $694 on 50 acres of the total 200 planted on the larger farm.

The influence of organization on costs is less pronounced. Increasing the acreage of high cost and high return crops such as cotton and potatoes and decreasing that of alfalfa reduces costs for cotton but not consistently. For example, by shifting from Organization I to II which requires a doubling of cotton and a 50 per cent reduction in potato and alfalfa acreage the per bale production cost of cotton declines only $1.85. By omitting the alfalfa and diverting the released alfalfa acreage entirely to potatoes (Organization III) the cotton production cost from Organization I to III falls only $ .93. Other comparisons can be made to illustrate the relationship between organizational changes and cost per unit of output but in all cases included in this study, the impact of scale on production costs overshadows that of organization.

An analysis of potato production cost data reveals a similar relationship between scale, organization and production costs (Table 13). Per acre costs, rather than per unit of output costs, are used in these comparisons because the large yields per acre in terms of hundredweights tend to hide actual variations. Per acre costs decline $5.07 on the average for the three organizations as size of farm increases from 80 to 160 acres. An additional average decline of $10.02 accompanies a further increase in size to 320 acres. This pattern of decline in cost as size increases does not duplicate that observed with cotton. A larger relative decline in cotton production costs accompanied the initial increase in size to 160 acres as compared with the change occurring between 160 and 320 acres. In the case of potatoes, the track-laying tractor and the potato planter are relatively more costly to operate than the wheel tractors and lighter equipment used in cotton production. Therefore, the introduction of the tracklayer with its limited use partially offsets the reduction in cost accompanying the increase in size to 160 acres. The decline in equipment cost reflects primarily the increased use of the one expensive implement, the potato planter.

While the influence of scale on potato production costs is more pronounced than that of organization, the latter does affect the level of costs by changing the utilization of resources. For example, potato production costs rise when the potato acreage is reduced by 50 per cent from Organization I to II. The elimination of alfalfa in the organization and the altered pattern of water utilization accompanying this change is largely responsible for an increase in per acre potato production costs though total acreage and potato acreage remain unchanged. Organizations I and III indicate this relationship for all three farm sizes.

Alfalfa is included in only two organizations. This limits the range of observed scale and organization influences on costs but both are in evidence (Table 14). Production costs per ton decline from $15.27 to $13.76 as size increases from 80 to 320 acres given an organization of equal acreages of cotton, potatoes, and alfalfa. Where alfalfa is reduced to one-sixth the total acreage of the farm, costs decline from $15.67 to $14.11 when farm size increases from 80 to 320 acres. A better utilization of haying and irrigation equipment on the organization with greater alfalfa acreage accounts for the major difference in per acre and per ton costs between Organizations I and II.

[illegible] [illegible] 160 atm. [illegible]

Under the influence of [illegible] [illegible] Table II. [illegible]

[illegible] in the [illegible] [illegible] 200 atm. [illegible] (Table I) [illegible]

The impact of scale is greater than that of organization for all three enterprises examined though both clearly influence the level of production costs. These costs must be considered as guides since other sets of assumptions regarding cost-price levels or enterprise organizations would alter these computed costs. It must also be emphasized that the level of costs for any individual farmer's operation will reflect his equipment, practices, choice of enterprise, organization, method of marketing, financing and a wide range of other factors which in turn reflect in part his individual view toward risk and uncertainty. For example, with adequate present and expected capital, a favorable attitude toward increased mechanization, sufficient present and expected cotton acreage, an operator might purchase a cotton picking machine which could conceivably lower his cotton production costs by $20 per bale.

Total Farm Earnings and Scale of Operation

Specific operating costs and production costs for each enterprise on farms of varying size and organization have been developed and compared. Sources of savings to the operators of larger farms have been discovered in the acquisition and operation of specific resources. A knowledge of the places in the farm business where costs can be reduced with changes in resource utilization through alteration of organization or increase in scale is highly useful to the individual operator. But, he should be aware of the effects of such changes on total farm expenses and gross and net returns, for cost reductions achieved by means of organizational shifts may result in wide variation in gross and net incomes.

This section focuses attention on the total farm earnings of the nine farms analyzed under two sets of assumptions. First, the assumption is maintained as in previous analysis that the farm operator on each farm size is fully employed. Secondly, this assumption is relaxed in the interest of obtaining a more accurate indication of the total impact of scale of operation on earnings. Any farm contains resources which are fixed in quantity and adaptability. On the smaller farms in this study area, the principal resource in this category appears to be the farm operator himself, specifically as a fixed farm labor supply.

The total farm budget analysis and conventional measures of farm earnings indicate the relationships between scale, organization and

earnings (Table 15).[10] Four common measures of earnings are computed for each farm: Net Farm Income, Labor Income, Management Income (or Profits) and Farm Capital Earnings. Net Farm Income, the basic measure from which the others are derived, is computed by subtracting from the sum of cash receipts and inventory increases, the sum of cash expenses and depreciation. On this type of farm, inventory changes of the kind considered in this calculation are uncommon. Labor Income (more precisely labor and management income of the farm operator and family) is computed by subtracting from Net Farm Income an estimated charge for the use of the capital invested in the business. An interest rate of 5 per cent is used in this study. An earning designed to reflect the residual accruing to the operator for his services as a manager, Management Income, is normally calculated by subtracting from cash receipts plus inventory increases the sum of the following: (1) cash expenses, (2) depreciation, (3) unpaid operator's labor, (4) unpaid family labor, and (5) interest on investment. In this study no subtraction for unpaid family labor was made since the use of family labor was either negligible or cash payments were made to members of the family for work performed. Farm capital earnings is a residual measure of return on the capital of the farm. It is obtained by subtracting the gross expenses (cash expenses, depreciation, value of unpaid operator's and family labor) from the gross receipts including any inventory increase.[11]

Regardless of measure considered, total farm earnings are significantly greater on larger farms. Organization exerts strong influence on level of earnings but the individual operator cannot achieve total earnings on the small farm equal to those of larger operators by adjusting his organization alone. However, the return on investment measured in percentage terms

---

[10] Appendix Tables 18 through 20 present cash expenses and receipts in detail for each of the nine farms.

[11] An explanation of some of the elements of the comparative measures will assist in interpreting the data presented in this table. Gross receipts and cash receipts are synonymous in this study since inventory increases of products held for sale on these summer cash crop farms is uncommon. Cash expenses are the product of individual per acre enterprise costs and acreage, using acreage and per acre costs from the appropriate farms. Total investment for each farm on which the interest charge is based represents the total investment in all resources for each given farm. Unpaid operator's labor consists of the value of the labor actually performed by the operator as determined from the calendars of operations. Total unpaid operator's labor is the product of hours devoted to each task and the appropriate rate of pay for each task.

[illegible]

[illegible]

6/ Appendix Table [illegible] attempts to present [illegible] expenses and revenues [illegible]

[illegible]

TABLE 15

Summary of Farm Budget Analysis and Comparative Earnings for Nine Farms

Comparative Measures	Farm Size and Organization a/								
	80 Acres			160 Acres			320 Acres		
	I	II	III	I	II	III	I	II	III
	$	$	$	$	$	$	$	$	$
Gross Receipts[b]	28,337.64	27,237.78	33,012.78	56,675.28	54,475.55	66,025.55	113,350.55	108,951.10	132,051.10
Cash Expenses	19,459.14	18,137.46	22,131.22	37,914.59	35,185.12	43,217.21	75,054.77	69,649.74	85,756.89
Depreciation	1,016.79	1,016.79	972.24	1,566.13	1,566.13	1,521.58	2,590.19	2,590.19	2,545.64
Gross Expenses	20,475.93	19,154.25	23,103.46	39,480.72	36,751.25	44,738.79	77,644.96	72,239.93	88,302.53
Net Farm Income	7,861.71	8,083.53	9,909.32	17,194.56	17,724.30	21,286.76	35,705.59	36,711.17	43,748.57
Interest on Investment 5%	2,074.75	2,074.75	2,050.00	3,829.60	3,829.60	3,804.85	7,256.00	7,256.00	7,231.25
Operator's and Family's Labor Income	5,786.96	6,008.78	7,859.32	13,364.96	13,894.70	17,481.91	28,449.59	29,455.17	36,517.32
Unpaid Operator's Labor	1,055.78	1,188.18	785.72	895.94	794.16	769.76	676.30	768.42	620.28
Management Income	4,731.18	4,820.60	7,073.60	12,469.02	13,100.54	16,712.15	27,773.29	28,686.75	35,897.04
Net Farm Income	7,861.71	8,083.53	9,909.32	17,194.56	17,724.30	21,286.76	35,705.59	36,711.17	43,748.57
Unpaid Operator's Labor	1,055.78	1,188.18	785.72	895.94	794.16	769.76	676.30	768.42	620.28
Farm Capital Earnings	6,805.93	6,895.35	9,123.60	16,298.62	16,930.14	20,517.00	35,029.29	35,942.75	43,128.29
(% of Investment)	16.4%	16.6%	22.2%	21.3%	22.1%	27.0%	24.1%	24.8%	29.8%

a/ Constituents of organizations: Organization I, cotton 1/3, potatoes 1/3, alfalfa 1/3; Organization II, cotton 2/3, potatoes 1/6, alfalfa 1/6; Organization III, cotton 2/3, potatoes 1/3.

b/ Synonymous with cash receipts in this study.

indicates that the small operator can raise his returns on his money invested to nearly the level attained by the larger farmers.

Reduction of these data to a per crop acre basis facilitates comparison of scale and organization effects on individual farm earnings (Table 16). Significant increases in earnings on a per crop acre basis are indicated with all four measures. For example, Management Income which is frequently referred to as "profit" in this scheme of measurement increases from $63 to approximately $92.50 per acre as farm size increases from 80 to 320 acres with Organization I assumed in both cases (Figure 7). This is an increase of nearly 47 per cent. Of equal or greater importance is the fact that the same percentage increase in per acre profit can be attained through organizational change on the 80-acre farm by transferring the alfalfa acreage to cotton. This conclusion and all others are predicated on the 1949 cost-price relationships, a given technology, and an assumption of fully employed resources at the farm level. Slight alterations in these assumptions would lead to different results.

The range of earnings which can be derived from a farm of given size through organizational change is of vital concern to the individual small farm operator with the desire to expand his farm business but lacking the necessary capital to increase the physical size of his farm through purchase. Capital for additional production expenses must be available if the greater resource-consuming enterprises are to be expanded, but the returns to these production expenditures are relatively greater than the returns accruing to expenditures for purchase of additional physical plant in the form of land and equipment. The possibility of leasing additional land must be recognized but conditions of leasing and bases of rental payment vary so widely that its inclusion is difficult. This does not mean that additional expenditures in land and equipment are uneconomic for the small farmer for such is not the case. On the contrary, the smaller farm operator can increase his earnings by either increasing his scale of operations or shifting his limited resources to the more intensive higher cost-higher income enterprises. However, the operator with relatively limited capital may well receive greater returns on his money through the latter course. Again it is desirable to indicate that the assumed level of costs and prices yields these results and other sets of assumptions might alter the findings, at least in degree.

TABLE 16

Comparative Earnings per Crop Acre for Nine Farms

Comparative Measures	Farm Size and Organization a/								
	80 Acres			160 Acres			320 Acres		
	I	II	III	I	II	III	I	II	III
	$	$	$	$	$	$	$	$	$
Net Farm Income	104.82	107.78	132.12	114.63	118.16	141.91	119.02	122.37	145.83
Operator's and Family's Labor Income	77.16	80.12	104.79	89.10	92.63	116.55	94.83	98.18	121.72
Management Income	63.08	64.27	94.31	83.13	87.34	111.41	92.58	95.62	119.66
Farm Capital Earnings	90.75	91.94	121.65	108.66	112.87	136.78	116.76	119.81	143.76

a/ Constituents of organizations: Organization I, cotton 1/3, potatoes 1/3, alfalfa 1/3; Organization II, cotton 2/3, potatoes 1/6, alfalfa 1/6; Organization III, cotton 2/3, potatoes 1/3.

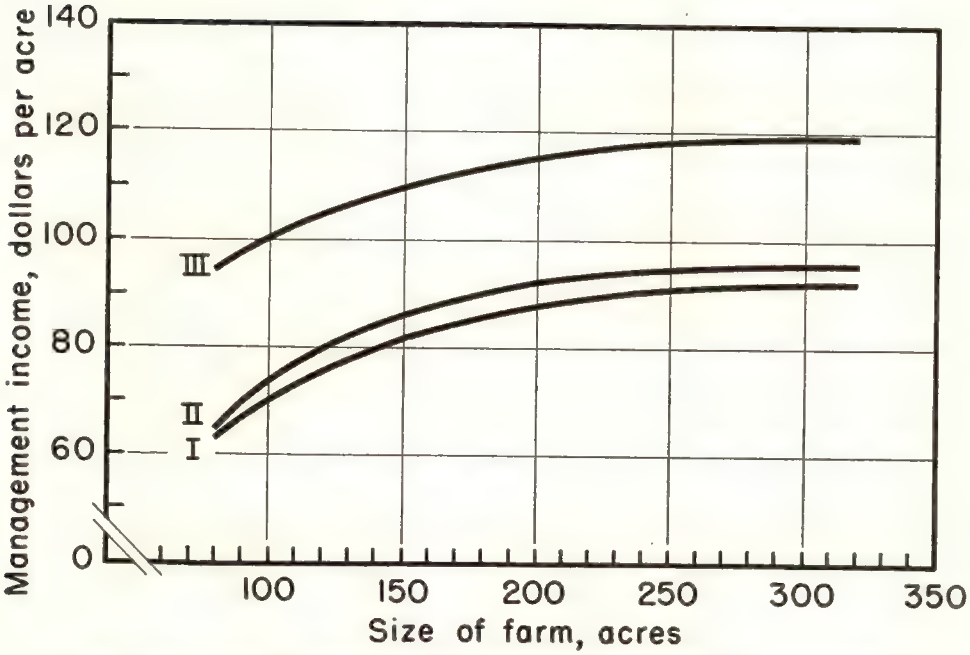


Figure 7. Relationship of Scale of Operations and Management Income on Three Systems of Enterprise Organization.

The assumption of fully employed resources on each farm has been adhered to in the preceding analysis. Relaxing this assumption by charging the cost of available (and fixed) labor against the farm business for each farm indicates that the advantages accruing to large farms (and disadvantages to smaller farms) have been understated. To illustrate, the per acre earnings for the three farms of Organization I have been computed charging the farm business for available labor not actually engaged in productive pursuits on the farm at the prevalent rate of pay for the lowest paying task customarily performed by the operator (Table 17).[12/] Relatively large reductions occur in the earnings of the 80-acre farm where the greatest amount of "unemployment" for the operator is found to exist. Management income declines approximately 25 per cent when wages are charged against the farm business by the operator when he is not employed in productive pursuits.

TABLE 17

Comparative Earnings Per Crop Acre for Three Farms with Organization I Charging Actual Labor Performed and Labor Available Against the Farm Business

Comparative Earnings	Size of Farm					
	80 Acres		160 Acres		320 Acres	
	Labor Performed	Labor Available	Labor Performed	Labor Available	Labor Performed	Labor Available
Management Income	$63.08	$48.31	$ 83.13	$ 78.54	$ 92.58	$ 89.34
Farm Capital Earnings	90.75	75.97	108.66	104.07	116.76	113.52

This last portion of the total farm analysis serves only to illustrate the general problem of the influence of less than full employment of the fixed labor resource on the farm. Further study of the value of the farmer's output for the many necessary tasks performed other than actual field work must be conducted in order to more accurately measure the exact "cost" of this employment at tasks yielding lower returns. The above computation might best be viewed as the lower and upper limit of earnings

---

12/ Eighty cents per hour in all cases for this analysis. No change in Net Farm Income or Operator's and Family's Labor Income measures occurs with this relaxation of assumptions since unpaid operator's labor does not enter into the calculation of these measures.

since in essence the assumption of no employment other than field tasks was compared with that of full employment of the farm operator as laborer.

All farm earnings measures indicate that the greatest per acre advantages develop when increasing from 80 to 160 acres, the increments arising thereafter being significant but considerably smaller. This reflects directly the use made of the factors of production at the disposal of the farm operator, an important part of which is his own labor resource. An institutional characteristic of American farms is that the farm operator supplies at least some portion of the labor, and, in a large percentage of the cases, the major labor supply. In these latter instances, a condition of full time employment does not always prevail. It is to this problem that the above analysis is directed and it has served to focus attention on the economic implications of the operator's joint function as owner, manager, and laborer.

Summary and Conclusions

The scale of operations on cotton-potato farms in Northern Kern County directly affects the utilization of resources, costs of production and returns to the farm operator. Changes in enterprise organization also result in shifts in utilization, costs, and returns. The small operator's need for sufficient income for himself and family necessitates a more strict adherence to the two primary cash crops, cotton and potatoes. Thus, greater flexibility in enterprise organization appears to accompany increasing scale of operation.

Minor differences in production practices and available resources are found on farms of different sizes. In terms of total investment per crop acre in all resources other than labor, the 80-acre farm with cotton, potatoes, and alfalfa requires an investment of $553, the 160-acre farm $511, and the 320-acre farm $484.

These observed reductions in investment with increasing farm size reflect the fact that some required yet expensive resources such as farm equipment can service a range of farm sizes. Utilization of resources can thus be viewed as a function of size though the influence of organization must also be recognized. To illustrate, the cost per hour of operation for a W-3 tractor on a 50-acre farm with equal acreages of cotton, potatoes, and alfalfa in the organization is $2.03 using 1949 data. On a 120-acre

farm with identical organization, the cost is $1.17 per hour. Annual use varies from 294 hours on the 50-acre farm to 706 hours on the 120-acre farm. With two organizations of an 80-acre farm the W-3 tractor costs $1.54 per hour to operate where it is used 441 hours and only $1.38 per hour with 525 hours of annual use. Equipment costs and costs for pumping water exhibit the same relationships. For example, an increase in farm size from 80 to 320 acres with an organization of one-third each of cotton, potatoes, and alfalfa results in a decline in water cost per acre foot from $7.41 to $6.35.

Production costs of specific crops on a per unit of output basis vary with both size and organization. Depending on which of three organizations is selected for analysis, the cost per bale for producing cotton varies between $112.32 and $110.47 on the 80-acre farm. For comparable organizations on 160-acre farms the cost varies between $106.51 and $105.76, and on the 320-acre farm the limits are $104.78 and $104.32. These are based on a yield of 2.1 bales per acre, 1949 costs and production practices. Both potato and alfalfa production costs decline with increasing size of farm. The influence of organization on costs is less pronounced within the range of alternative enterprise organizations considered in this study.

Changes in scale and organization provide means of reducing costs on individual farms but the impact of these changes on the net farm income must be evaluated before any alteration is undertaken. The analysis of the earnings of the nine farms of three sizes reveals that total farm earnings are significantly greater on larger farms. Organization also exerts strong influence on the net farm income because of its impact on gross receipts. An individual farm operator can vary his net income over a significant range with no change in size of farm. It was found that if a farm organization with equal acreages of cotton, potatoes, and alfalfa is of 80 acres in size, a management income of $63 per acre can be expected under 1949 cost and price levels. The same organization on 320 acres will yield a management income of $92.50 per acre. But, by transferring the alfalfa acreage to cotton on the 80-acre farm, the same increase in per acre management income can be obtained with no increase in size of farm. An organizational change on the 320-acre farm to cotton and potatoes alone

increases management income to a new level on that size also, which precludes the chance for the small farm operator to equate his net returns to those of the large operator if organizations are comparable.

These findings are particularly relevant to the operators of small farms--those of 160 acres and less. Those operators with limited capital resources who desire to expand their incomes may also benefit from the data presented in this report. Additional study of employment of small farm operators at other than field tasks must be undertaken before the costs accruing to small farms because of underemployed resources can be quantified, though the upper and lower limits of these costs have been established.

APPENDIX TABLE 1

Physical Resources and Investments Required
for Three Organizations of an 80 Acre Farm

Physical Resources	Organization I		Organization II		Organization III	
	Investment per Unit	Total Investment	Investment per Unit	Total Investment	Investment per Unit	Total Investment
Land, 80 Acres	$ 300	$24,000	$ 300	$24,000	$ 300	$24,000
Buildings						
Dwelling	4,500		4,500		4,500	
Tractor Shed	400		400		400	
Shop-Storage Shed	915	5,815	915	5,815	915	5,815
Irrigation System						
900 G.P.M. Well and pump	7,015		7,015		7,015	
Underground Concrete System	3,489	10,504	3,489	10,504	3,489	10,504
Motive Power						
W-3 Tractor	2,490	2,490	2,490	2,490	2,490	2,490
Farm Equipment						
10' Cultipacker	210		210		210	
2-Row Cultivator	180		180		180	
2-Row Fertilizer Attach.	75		75		75	
4-Row Lister	315		315		315	
4-Row Lister Planter	405		405		405	
7' Offset Disk Harrow	341		341		341	
2-Row Potato Planter and Fertilizer Attachment	570		570		570	
2-16" (2-way) Plow	325		325		325	
7' Power Mower	180		180		---	
8' Side Delivery Rake	315		315		---	
12' Spike Harrow	60		60		60	
2-Row Stalk Cutter	95		95		95	
6' Steel Roller	115	3,186	115	3,186	115	2,691
TOTAL INVESTMENT		$45,995		$45,995		$45,500

APPENDIX TABLE 2

Physical Resources and Investments Required for Three Organizations of a 160 Acre Farm

Physical Resources	Organization I		Organization II		Organization III	
	Investment per Unit	Total Investment	Investment per Unit	Total Investment	Investment per Unit	Total Investment
Land, 160 Acres	$ 300	$48,000	$ 300	$48,000	$ 300	$48,000
Buildings						
Dwelling	4,500		4,500		4,500	
Tractor Shed	750		750		750	
Shop-Storage Shed (equipped)	1,565	6,815	1,565	6,815	1,565	6,815
Irrigation System						
900 G.P.M. Well and Pump	7,015		7,015		7,015	
700 G.P.M. Well and Pump	4,600		4,600		4,600	
Underground Concrete System	7,122	18,737	7,122	18,737	7,122	18,737
Motive Power						
W-2 Tractor	1,485		1,485		1,485	
DT-3 Tractor	2,990	4,475	2,990	4,475	2,990	4,475
Farm Equipment						
8' Chisel	305		305		305	
10' Cultipacker	210		210		210	
2-Row Cultivator	180		180		180	
2-Row Fertilizer Attach.	75		75		75	
2-Row Lister	170		170		170	
4-Row Lister Planter	405		405		405	
7½' Offset Disk Harrow	385		385		385	
2-Row Potato Planter and Fertilizer Attachment	570		570		570	
7' Power Mower	180		180		---	
8' Side Delivery Rake	315		315		---	
12' Spike Harrow	60		60		60	
2-Row Stalk Cutter	95		95		95	
6' Steel Roller	115	3,065	115	3,065	115	2,570
TOTAL INVESTMENT		$81,092		$81,092		$80,597

APPENDIX TABLE 3

Physical Resources and Investments Required for Three Organizations of a 320 Acre Farm

Physical Resources	Organization I		Organization II		Organization III	
	Investment per Unit	Total Investment	Investment per Unit	Total Investment	Investment per Unit	Total Investment
Land, 320 Acres	$ 300	$96,000	$ 300	$96,000	$ 300	$96,000
Buildings						
Dwelling	6,000		6,000		6,000	
Tractor Shed	1,100		1,100		1,100	
Shop-Storage Shed (equipped)	2,050	9,150	2,050	9,150	2,050	9,150
Irrigation System						
3-700 G.P.M.Wells and Pumps	13,800		13,800		13,800	
1-900 G.P.M.Well and Pump	7,015		7,015		7,015	
Underground Concrete System	14,244	35,059	14,244	35,059	14,244	35,059
Motive Power						
W-2 Tractor	1,485		1,485		1,485	
W-3 Tractor	2,490		2,490		2,490	
DT-3 Tractor	2,990	6,965	2,990	6,965	2,990	6,965
Farm Equipment						
8' Chisel	305		305		305	
10' Cultipacker	210		210		210	
2-2 Row Cultivators	360		360		360	
2-2 Row Fertilizer Attach.	150		150		150	
4-Row Lister	315		315		315	
4-Row Lister Planter	405		405		405	
7' Offset Disk Harrow	341		341		341	
10' Offset Disk Harrow	525		525		525	
7' Power Mower	180		180		---	
2-Row Potato Planter and Fertilizer Attachment	570		570		570	
8' Side Delivery Rake	315		315		---	
12' Spike Harrow	60		60		60	
2-Row Stalk Cutter	95		95		95	
6' Steel Roller	115	3,946	115	3,946	115	3,451
TOTAL INVESTMENT		151,120		151,120		150,625

APPENDIX TABLE 4

Annual Utilization, Total Cost, and Cost Per Hour of Operation for Farm Tractors on the Three Farms of Organization I

Farm Tractors and Cost Items	80 Acres			160 Acres			320 Acres		
	Annual Use (hours)	Total Annual Cost	Cost per Hour Operated	Annual Use (hours)	Total Annual Cost	Cost per Hour Operated	Annual Use (hours)	Total Annual Cost	Cost per Hour Operated
W-2				651			959		
Overhead		$	$		$216.60	$		$216.60	$
Fuel					187.26			303.93	
Cylinder Oil					39.04			57.54	
Other Oil and Grease					4.62			6.79	
Repairs					31.19			31.19	
Servicing					12.05			17.76	
Total					490.76	.75		633.81	.66
W-3	441						418		
Overhead		362.73						362.73	
Fuel		199.68						171.83	
Cylinder Oil		29.77						28.22	
Other Oil and Grease		3.25						2.96	
Repairs		74.70						52.29	
Servicing		8.17						7.74	
Total		678.30	1.54					625.77	1.50
DT-3				220			287		
Overhead					435.40			435.40	
Fuel					44.43			57.98	
Cylinder Oil					24.71			32.30	
Other Oil and Grease					1.56			2.03	
Repairs					62.79			62.79	
Servicing					6.10			7.98	
Total					574.99	2.61		598.48	2.09

APPENDIX TABLE 5

Annual Utilization, Total Cost, and Cost Per Hour of Operation for Farm Tractors on the Three Farms of Organization II

Farm Tractors and Cost Items	80 Acres			160 Acres			320 Acres		
	Annual Use (hours)	Total Annual Cost	Cost per Hour Operated	Annual Use (hours)	Total Annual Cost	Cost per Hour Operated	Annual Use (hours)	Total Annual Cost	Cost per Hour Operated
W-2				798.5			1112		
Overhead		$	$		$216.60	$		$216.60	$
Fuel					229.73			320.00	
Cylinder Oil					47.90			66.71	
Other Oil and Grease					5.66			7.88	
Repairs					31.19			31.19	
Servicing					14.78			20.59	
Total					545.86	.68		662.97	.60
W-3	520.5						646		
Overhead		362.73						362.73	
Fuel		235.54						265.66	
Cylinder Oil		35.11						43.62	
Other Oil and Grease		3.83						4.58	
Repairs		74.70						52.29	
Servicing		9.63						11.97	
Total		721.54	1.39					740.85	1.15
DT-3				230			210		
Overhead					435.40			435.40	
Fuel					46.45			42.41	
Cylinder Oil					25.88			23.59	
Other Oil and Grease					1.63			1.49	
Repairs					62.79			62.79	
Servicing					6.39			5.83	
Total					578.54	2.52		571.51	2.72

APPENDIX TABLE 6

Annual Utilization, Total Cost, and Cost Per Hour of Operation For Farm Tractors on the Three Farms of Organization III

Farm Tractors and Cost Items	80 Acres			160 Acres			320 Acres		
	Annual Use (hours)	Total Annual Cost	Cost per Hour Operated	Annual Use (hours)	Total Annual Cost	Cost per Hour Operated	Annual Use (hours)	Total Annual Cost	Cost per Hour Operated
W-2				735			927		
Overhead		$	$		$216.60	$		$216.60	$
Fuel					211.60			266.77	
Cylinder Oil					44.11			55.62	
Other Oil and Grease					5.20			6.57	
Repairs					31.19			31.19	
Servicing					13.62			17.17	
Total					522.32	.71		593.92	.64
W-3	525						660		
Overhead		362.73						362.73	
Fuel		237.57						271.32	
Cylinder Oil		35.42						44.55	
Other Oil and Grease		3.87						4.68	
Repairs		74.70						52.29	
Servicing		9.72						12.22	
Total		724.01	1.38					747.79	1.13
DT-3				300			367		
Overhead					435.40			435.40	
Fuel					60.60			74.14	
Cylinder Oil					33.72			41.29	
Other Oil and Grease					2.12			2.60	
Repairs					62.79			62.79	
Servicing					8.33			10.20	
Total					602.96	2.01		626.42	1.71

APPENDIX TABLE 7

Annual Utilization, Total Cost, and Cost Per Hour of Operation for Farm Equipment on the Three Farms of Organization I

Equipment	80 Acres			160 Acres			320 Acres		
	Annual Use (Hours)	Total Annual Cost	Cost Per Hour Oper.	Annual Use (Hours)	Total Annual Cost	Cost Per Hour Oper.	Annual Use (Hours)	Total Annual Cost	Cost Per Hour Oper.
		$	$		$	$		$	$
8' Chisel	--	--	--	60	37.52	.63	120	40.73	.34
10' Cultipacker	7.5	27.20	3.63	15	27.83	1.86	30	30.03	1.00
2-Row Cultivator[a]	135	23.32	.17	270	23.88	.09	520	25.70	.05
2-Row Lister	--	--	--	50	22.70	.45	--	--	--
4-Row Lister	15	37.80	2.52	--	--	--	60	42.06	.70
4-Row Lister Planter	7.5	54.68	7.29	15	55.90	3.72	30	60.15	2.01
7' Offset Disk	50	42.05	.84	--	--	--	150	45.53	.30
7½' Offset Disk	--	--	--	100	51.41	.51	--	--	--
10' Offset Disk	--	--	--	--	--	--	40	70.10	1.75
2-Row Potato Planter	27.5	76.61	2.79	60	78.67	1.31	120	84.65	.71
2-16" 2-way Plow	50	46.32	.93	--	--	--	--	--	--
7' Power Mower	60	24.35	.41	119	24.88	.21	233	26.73	.11
8' Side Delivery Rake	56	42.52	.76	112	43.54	.39	221	46.78	.21
8' Spike Harrow	12.5	4.76	.38	25	4.85	.19	60	5.34	.09
12' Spike Harrow	15	7.20	.48	30	7.38	.25	60	8.01	.13
2-Row Stalk Cutter	10	12.78	1.27	25	13.21	.53	50	14.21	.28
6' Steel Roller	7.5	13.79	1.84	15	14.14	.94	30	15.35	.51
Fertilizer Attach.[a]	17.5	10.12	.58	35	10.35	.30	70	22.27	.32

[a] The 320 acre farm in all organizations contains two of each of these pieces of equipment.

APPENDIX TABLE 8

Annual Utilization, Total Cost, and Cost Per Hour of Operation for Farm Equipment on the Three Farms of Organization II

Equipment	80 Acres			160 Acres			320 Acres		
	Annual Use (Hours)	Total Annual Cost	Cost Per Hour Oper.	Annual Use (Hours)	Total Annual Cost	Cost Per Hour Oper.	Annual Use (Hours)	Total Annual Cost	Cost Per Hour Oper.
		$	$		$	$		$	$
8' Chisel	--	--	--	75	37.52	.50	150	40.73	.27
10' Cultipacker	15	27.20	1.81	30	27.83	.93	60	30.03	.50
2-Row Cultivator[a/]	232.5	23.30	.10	465	23.85	.05	910	25.70	.03
2-Row Lister	--	--	--	62.5	22.70	.36	--	--	--
4-Row Lister	18.75	37.80	2.02	--	--	--	75	42.06	.56
4-Row Lister Planter	15	54.68	3.65	30	55.90	1.86	60	60.15	1.00
7' Offset Disk	62.5	42.02	.67	--	--	--	175	45.53	.26
7½' Offset Disk	--	--	--	125	51.41	.41	--	--	--
10' Offset Disk	--	--	--	--	--	--	60	70.10	1.17
2-Row Potato Planter	13.75	76.96	5.60	30	79.20	2.64	55	84.65	1.54
2-16" 2-way Plow	62.5	46.32	.74	--	--	--	--	--	--
7' Power Mower	30	24.30	.81	60	24.84	.41	120	26.73	.22
8' Side Delivery Rake	28	42.52	1.52	56	43.47	.78	113	46.78	.41
8' Spike Harrow	6.25	4.76	.76	12.5	4.85	.39	30	5.34	.18
12' Spike Harrow	18.75	7.20	.38	37.5	7.38	.20	75	8.01	.11
2-Row Stalk Cutter	20	12.78	.64	50	13.21	.26	100	14.21	.14
6' Steel Roller	3.75	13.79	3.68	7.5	14.14	1.89	15	15.35	1.02
Fertilizer Attach.[a/]	35.0	10.05	.29	70	10.25	.15	160	22.27	.19

a/ The 320 acre farm in all organizations contains two of each of these pieces of equipment.

APPENDIX TABLE 9

Annual Utilization, Total Cost, and Cost Per Hour of Operation for Farm Equipment on the Three Farms of Organization III

Equipment	80 Acres			160 Acres			320 Acres		
	Annual Use (Hours)	Total Annual Cost	Cost Per Hour Oper.	Annual Use (Hours)	Total Annual Cost	Cost Per Hour Oper.	Annual Use (Hours)	Total Annual Cost	Cost Per Hour Oper.
		$	$		$	$		$	$
8' Chisel	--	--	--	90	37.52	.42	180	40.73	.23
10' Cultipacker	15	27.32	1.82	30	28.04	.93	55	30.03	.55
2-Row Cultivator a/	245	23.35	.10	490	23.92	.05	928	25.70	.03
2-Row Lister	--	--	--	75	22.70	.30	--	--	--
4-Row Lister	22.5	37.71	1.68	--	--	--	94	42.06	.45
4-Row Lister Planter	15	54.31	3.62	30	55.38	1.85	68	60.15	.88
7' Offset Disk	75	40.73	.54	--	--	--	226	45.53	.20
7½' Offset Disk	--	--	--	150	51.41	.34	--	--	--
10' Offset Disk	--	--	--	--	--	--	63	70.10	1.11
2-Row Potato Planter	27.5	76.44	2.78	60	78.55	1.31	123	84.65	.69
2-16" 2-way Plow	75	46.32	.62	--	--	--	--	--	--
8' Spike Harrow	12.5	5.60	.45	25	4.85	.19	58	5.34	.09
12' Spike Harrow	22.5	7.20	.32	45	7.39	.16	89	8.01	.09
2-Row Stalk Cutter	20	12.78	.64	50	13.21	.26	98	14.21	.15
6' Steel Roller	7.5	13.79	1.84	15	14.14	.94	30	15.35	.51
Fertilizer Attach. a/	35.0	10.13	.29	70	10.35	.15	139	22.27	.16

a/ The 320 acre farm in all organizations contains two of each of these pieces of equipment.

APPENDIX TABLE 10

Costs of Producing Cotton on 80, 160, and 320 Acre
Farms with Organization I
(Yield 2.1 Bales Per Acre)

Inputs	80 Acres			160 Acres			320 Acres		
	Units of Inputs Per Acre (hours)	Cost per Unit of Input	Total Cost	Units of Inputs per Acre (hours)	Cost per Unit of Input	Total Cost	Units of Inputs per Acre (hours)	Cost per Unit of Input	Total Cost
Labor:									
Tractor Driver	8.0	$1.00	$ 8.00	7.9	$1.00	$ 7.90	7.3	$1.00	$ 7.30
Irrigator	12.5	.80	10.00	10.1	.80	8.08	10.1	.80	8.08
General	1.3	.80	1.04	1.3	.80	1.04	1.3	.80	1.04
Total Labor			19.04			17.02			16.42
Contracted and Piece Work:									
Chopping	5.3	.75	3.98	5.3	.75	3.98	5.3	.75	3.98
Hoeing	3.8	.75	2.85	3.8	.75	2.85	3.8	.75	2.85
Picking, Hand			95.55			95.55			95.55
Dusting, 2X			2.40			2.40			2.40
Defoliating			4.00			4.00			4.00
Ginning			26.86			26.86			26.86
Total Contracted Piece Work			135.64			135.64			135.64
Motive Power:									
W-2	-	-	-	6.3	.75	4.72	3.8	.66	2.51
W-3	8.0	1.54	12.32	-	-	-	2.5	1.50	3.75
DT-3	-	-	-	1.6	2.61	4.18	1.0	2.09	2.09
1/2 T Pick-up Truck (miles)	15.0	.08	1.20	15.0	.07	1.05	15.0	.06	.90
Total Motive Power			13.52			9.95			9.25

Continued-

Appendix Table 10 Contd.

Inputs	80 Acres			160 Acres			320 Acres		
	Units of Inputs per Acre (hours)	Cost per Unit of Input	Total Cost	Units of Inputs per Acre (hours)	Cost per Unit of Input	Total Cost	Units of Inputs per Acre (hours)	Cost per Unit of Input	Total Cost
Farm Equipment:									
5 Bale Cotton Trailer	1.0	$1.37	$ 1.37	1.0	$ .70	$ .70	1.0	$ .38	$ .38
2-Row Stalk Cutter	.4	1.27	.51	.5	.53	.26	.5	.28	.14
7 1/2' Offset Disk	-	-	-	1.0	.51	.51	-	-	-
10' Offset Disk	-	-	-	-	-	-	.4	1.75	.70
7' Offset Disk	1.0	.84	.84	-	-	-	.4	.30	.12
2-16" (2-way)	1.0	.93	.93	-	-	-	-	-	-
8' Chisel	-	-	-	.6	.63	.38	.6	.34	.20
2-Row Lister	-	-	-	.5	.45	.23	-	-	-
4-Row Lister	.3	2.52	.76	-	-	-	.3	.70	.21
12' Spike Harrow	.3	.48	.14	.3	.25	.08	.3	.13	.04
4-Row Lister Planter	.3	7.29	2.19	.3	3.72	1.12	.3	2.01	.60
10' Cultipacker	0.3	3.63	1.09	0.3	1.86	.56	.3	1.00	.30
2-Row Cultivator	4.4	.17	.75	4.4	.09	.40	4.2	.05	.21
2-Row Fertilizer Attach.	.7	.58	.41	.7	.30	.21	.7	.34	.24
Total Equipment			8.99			4.45			3.14
Materials:									
Seed (lbs.)	30.0	.06	1.80	30.0	.06	1.80	30.0	.06	1.80
Water (Acre Feet)	3.2	7.41	23.71	3.2	6.73	21.54	3.2	6.35	20.32
Fertilizer (lbs.)	325.0	.0266	8.64	325.0	.0266	8.64	325.0	.0266	8.64
Dust (lbs.)	60.0	.0545	3.27	60.0	.0545	3.27	60.0	.0545	3.27
Total Materials			37.42			35.25			34.03
Miscellaneous:									
Compensation Insurance			.01			.12			.16
Taxes			6.25			6.25			6.25
Interest (5% on $300)			15.00			15.00			15.00
Total Miscellaneous			21.26			21.37			21.41
Total Cost Per Acre			235.87			223.68			219.89
Total Cost Per Bale			112.32			106.51			104.71

APPENDIX TABLE 11

Costs of Producing Cotton on 80, 160, and 320 Acre Farms with Organization II
(Yield 2.1 Bales Per Acre)

Inputs	80 Acres			160 Acres			320 Acres		
	Units of Inputs Per Acre (hours)	Cost per Unit of Input	Total Cost	Units of Inputs per Acre (hours)	Cost per Unit of Input	Total Cost	Units of Inputs per Acre (hours)	Cost per Unit of Input	Total Cost
Labor:									
Tractor Driver	8.0	$1.00	$ 8.00	7.9	$1.00	$ 7.90	7.5	$1.00	$ 7.50
Irrigator	12.5	.80	10.00	10.1	.80	8.08	10.1	.80	8.08
General	1.3	.80	1.04	1.3	.80	1.04	1.3	.80	1.04
Total Labor			19.04			17.02			16.62
Contracted and Piece Work:									
Chopping	5.3	.75	3.98	5.3	.75	3.98	5.3	.75	3.98
Hoeing	3.8	.75	2.85	3.8	.75	2.85	3.8	.75	2.85
Picking, Hand			95.55			95.55			95.55
Dusting, 2X			2.40			2.40			2.40
Defoliating			4.00			4.00			4.00
Ginning			26.86			26.86			26.86
Total Contracted Piece Work			135.64			135.64			135.64
Motive Power:									
W-2	-	-	-	6.3	.68	4.28	4.0	.60	2.40
W-3	8.0	1.39	11.12	-	-	-	2.6	1.15	2.99
DT-3	-	-	-	1.6	2.52	4.03	.9	2.72	2.45
1/2 T Pick-up Truck (miles)	15.0	.08	1.20	15.0	.07	1.05	15.0	.06	.90
Total Motive Power			12.32			9.36			8.74

Continued-

Appendix Table 11 Contd.

Inputs	80 Acres			160 Acres			320 Acres		
	Units of Inputs per Acre (hours)	Cost per Unit of Input	Total Cost	Units of Inputs per Acre (hours)	Cost per Unit of Input	Total Cost	Units of Inputs per Acre (hours)	Cost per Unit of Input	Total Cost
Farm Equipment:									
5 Bale Cotton Trailer	1.0	$ .68	$ .68	1.0	$ .35	$ .35	1.0	$ .19	$ .19
2-Row Stalk Cutter	.4	.64	.26	.5	.26	.13	.5	.14	.07
7 1/2' Offset Disk	-	-	-	1.0	.41	.41	-	-	-
10' Offset Disk	-	-	-	-	-	-	.3	1.17	.35
7' Offset Disk	1.0	.67	.67	-	-	-	.6	.26	.16
2-16" (2-way)	1.0	.74	.74	-	-	-	-	-	-
8' Chisel	-	-	-	.6	.50	.30	.6	.27	.16
2-Row Lister	-	-	-	.5	.36	.18	-	-	-
4-Row Lister	.3	2.02	.61	-	-	-	.3	.56	.17
12' Spike Harrow	.3	.38	.11	.3	.20	.06	.3	.11	.03
4-Row Lister Planter	.3	3.65	1.10	.3	1.86	.56	.3	1.00	.30
10' Cultipacker	.3	1.81	.54	.3	.93	.28	.3	.50	.15
2-Row Cultivator	4.4	.10	.44	4.4	.05	.22	4.3	.03	.13
2-Row Fertilizer Attach.	.7	.29	.20	.7	.15	.10	.8	.07	.06
Total Equipment			5.35			2.59			1.77
Materials:									
Seed (lbs.)	30.0	.06	1.80	30.0	.06	1.80	30.0	.06	1.80
Water (Acre Feet)	3.2	7.71	24.67	3.2	7.00	22.40	3.2	6.62	21.18
Fertilizer (lbs.)	325.0	.0266	8.64	325.0	.0266	8.64	325.0	.0266	8.64
Dust (lbs.)	60.0	.0545	3.27	60.0	.0545	3.27	60.0	.0545	3.27
Total Materials			38.38			36.11			34.89
Miscellaneous:									
Compensation Insurance			.01			.12			.16
Taxes			6.25			6.25			6.25
Interest (5% on $300)			15.00			15.00			15.00
Total Miscellaneous			21.26			21.37			21.41
Total Cost Per Acre			231.99			222.09			219.07
Total Cost Per Bale			110.47			105.76			104.32

APPENDIX TABLE 12

Costs of Producing Cotton on 80, 160, and 320 Acre
Farms with Organization III
(Yield 2.1 Bales Per Acre)

Inputs	80 Acres			160 Acres			320 Acres		
	Units of Inputs Per Acre (hours)	Cost per Unit of Input	Total Cost	Units of Inputs Per Acre (hours)	Cost per Unit of Input	Total Cost	Units of Inputs Per Acre (hours)	Cost per Unit of Input	Total Cost
Labor:									
Tractor Driver	8.0	$1.00	$ 8.00	7.9	$1.00	$ 7.90	7.4	$1.00	$ 7.40
Irrigator	12.5	.80	10.00	10.1	.80	8.08	10.1	.80	8.08
General	1.3	.80	1.04	1.3	.80	1.04	1.3	.80	1.04
Total Labor			19.04			17.02			16.52
Contracted and Piece Work:									
Chopping	5.3	.75	3.98	5.3	.75	3.98	5.3	.75	3.98
Hoeing	3.8	.75	2.85	3.8	.75	2.85	3.8	.75	2.85
Picking, Hand			95.55			95.55			95.55
Dusting, 2X			2.40			2.40			2.40
Defoliating			4.00			4.00			4.00
Ginning			26.86			26.86			26.86
Total Contracted Piece Work			135.64			135.64			135.64
Motive Power:									
W-2	-	-	-	6.3	.71	4.47	3.8	.64	2.43
W-3	8.0	1.38	11.04	-	-	-	2.6	1.13	2.94
DT-3	-	-	-	1.6	2.01	3.22	.9	1.71	1.54
1/2 T Pick-up Truck (miles)	15.0	.08	1.20	15.0	.07	1.05	15.0	.06	.90
Total Motive Power			12.24			8.74			7.81

Continued-

Appendix Table 12 Contd.

Inputs	80 Acres			160 Acres			320 Acres		
	Units of Inputs per Acre (hours)	Cost per Unit of Input	Total Cost	Units of Inputs per Acre (hours)	Cost per Unit of Input	Total Cost	Units of Inputs per Acre (hours)	Cost per Unit of Input	Total Cost
Farm Equipment:									
5 Bale Cotton Trailer	1.0	$ .68	$ .68	1.0	$ .35	$ .35	1.0	$ .19	$ .19
2-Row Stalk Cutter	.4	.64	.26	.5	.26	.13	.5	.15	.08
7 1/2' Offset Disk	-	-	-	1.0	.34	.34	-	-	-
10' Offset Disk	-	-	-	-	-	-	.3	1.11	.33
7' Offset Disk	1.0	.54	.54	-	-	-	.6	.20	.12
2-16" (2-way)	1.0	.62	.62	-	-	-	-	-	-
8' Chisel	-	-	-	.6	.42	.25	.6	.23	.14
2-Row Lister	-	-	-	.5	.30	.15	-	-	-
4-Row Lister	.3	1.68	.50	-		-	.3	.45	.14
12' Spike Harrow	.3	.32	.10	.3	.16	.05	.3	.09	.03
4-Row Lister Planter	.3	3.62	1.09	.3	1.85	.56	.3	.88	.26
10' Cultipacker	.3	1.82	.55	.3	.93	.28	.3	.55	.16
2-Row Cultivator	4.4	.10	.44	4.4	.05	.22	4.1	.03	.12
2-Row Fertilizer Attach.	.7	.29	.20	.7	.15	.10	.7	.08	.06
Total Equipment			4.98			2.43			1.63
Materials:									
Seed (lbs.)	30.0	.06	1.80	30.0	.06	1.80	30.0	.06	1.80
Water (Acre Feet)	3.2	8.45	27.04	3.2	7.68	24.58	3.2	7.28	23.30
Fertilizer (lbs.)	325.0	.0266	8.64	325.0	.0266	8.64	325.0	.0266	8.64
Dust (lbs.)	60.0	.0545	3.27	60.0	.0545	3.27	60.0	.0545	3.27
Total Materials			40.75			38.29			37.01
Miscellaneous:									
Compensation Insurance			.01			.13			.17
Taxes			6.25			6.25			6.25
Interest (5% on $300)			15.00			15.00			15.00
Total Miscellaneous			21.26			21.38			21.42
Total Cost Per Acre			233.91			223.50			220.03
Total Cost Per Bale			111.39			106.43			104.78

APPENDIX TABLE 13

Costs of Producing Potatoes on 80, 160, and 320 Acre Farms with Organization I (Yield 290 cwt. Per Acre)

Inputs	80 Acres			160 Acres			320 Acres		
	Units of Inputs Per Acre (hours)	Cost per Unit of Input	Total Cost	Units of Inputs Per Acre (hours)	Cost per Unit of Input	Total Cost	Units of Inputs Per Acre (hours)	Cost per Unit of Input	Total Cost
Labor:									
Tractor Driver	5.0	$1.00	$ 5.00	4.9	$1.00	$ 4.90	4.8	$1.00	$ 4.80
Irrigator	9.3	.80	7.44	8.6	.80	6.88	8.4	.80	6.72
General	1.1	.80	.88	1.2	.80	.96	1.2	.80	.96
Total Labor			13.32			12.74			12.48
Contracted and Piece Work:									
Cutting Seed			4.50			4.50			4.50
Dusting			1.20			1.20			1.20
Rotobeating ($3.00/Acre)			3.00			3.00			3.00
Digging			10.00			10.00			10.00
Picking			40.60			40.60			40.60
Hauling ($ .10/Cwt.)			29.00			29.00			29.00
Shed Costs			145.00			145.00			145.00
Total Contracted Piece Work			233.30			233.30			233.30
Motive Power:									
W-2	-	-	-	2.1	.75	1.58	1.6	.66	1.06
W-3	5.0	1.54	7.70	-	-	-	1.4	1.50	2.10
DT-3	-	-	-	2.8	2.61	7.31	1.8	2.09	3.76
Total Motive Power			7.70			8.89			6.92

Continued-

Appendix Table 13 Contd.

Inputs	80 Acres			160 Acres			320 Acres		
	Units of Inputs Per Acre (hours)	Cost per Unit of Input	Total Cost	Units of Inputs Per Acre (hours)	Cost per Unit of Input	Total Cost	Units of Inputs Per Acre (hours)	Cost per Unit of Input	Total Cost
Farm Equipment:									
2-Row Lister	-	$ -	$ -	.5	$ .45	$ .22	-	$ -	$ -
4-Row Lister	.3	2.52	.76	-	-	-	.3	.70	.21
7' Offset Disk	1.0	.84	.84	-	-	-	1.1	.30	.33
7 1/2' Offset Disk	-	-	-	1.0	.51	.51	-	-	-
8' Chisel	-	-	-	.6	.63	.38	.6	.34	.20
8' Spike Harrow (2-4' sect.)	.5	.38	.19	.5	.19	.10	.6	.09	.05
2-16" (2-way plow)	1.0	.93	.93	-	-	-	-	-	-
2-Row Planter and Fert. Attach.	1.1	2.79	3.07	1.2	1.31	1.57	1.2	.71	.85
2-Row Cultivator	1.0	.17	.17	1.0	.09	.09	1.0	.05	.05
12' Spike Harrow (3-4' Sect.)	.3	.48	.14	.3	.25	.08	.3	.13	.04
6' Steel Roller	.3	1.84	.55	.3	.94	.28	.3	.51	.15
Total Equipment			6.65			3.23			1.88
Materials:									
Seed, dipped (Cwt)	18.0	5.00	90.00	18.0	5.00	90.00	18.00	5.00	90.00
Water (Acre Feet)	2.5	7.41	18.52	2.5	6.73	16.82	2.5	6.35	15.88
Fertilizer (Lbs.)	825.0	.0266	21.94	825.0	.0266	21.94	825.0	.0266	21.94
Gypsum, refined (Tons)	2.0	12.00	24.00	2.0	12.00	24.00	2.0	12.00	24.00
Dust (Lbs.)	30.0	.0545	1.64	30.0	.0545	1.64	30.0	.0545	1.64
Gypsum, commercial (Lbs.)	500.0	.006	3.00	500.0	.006	3.00	500.0	.006	3.00
Total Materials			159.10			157.40			156.46
Miscellaneous:									
Compensation Insurance			.03			.11			.10
Taxes			6.25			6.25			6.25
Interest (5% on $300)			15.00			15.00			15.00
Total Miscellaneous			21.28			21.36			21.35
Total Cost Per Acre			441.35			436.92			432.39
Cost Per Cwt.			1.52			1.51			1.49

APPENDIX TABLE 14

Costs of Producing Potatoes on 80, 160 and 320 Acre
Farms with Organization II
(Yield 290 Cwt. Per Acre)

Inputs	80 Acres			160 Acres			320 Acres		
	Units of Inputs Per Acre (hours)	Cost per Unit of Input	Total Cost	Units of Inputs Per Acre (hours)	Cost per Unit of Input	Total Cost	Units of Inputs Per Acre (hours)	Cost per Unit of Input	Total Cost
Labor:									
Tractor Driver	5.0	$1.00	$ 5.00	4.9	$1.00	$ 4.90	4.7	$1.00	$ 4.70
Irrigator	9.3	.80	7.44	8.6	.80	6.88	8.6	.80	6.88
General	1.1	.80	.88	1.2	.80	.96	1.1	.80	.88
Total Labor			13.32			12.74			12.46
Contracted and Piece Work:									
Cutting Seed			4.50			4.50			4.50
Dusting			1.20			1.20			1.20
Rotobeating			3.00			3.00			3.00
Digging			10.00			10.00			10.00
Picking			40.60			40.60			40.60
Hauling			29.00			29.00			29.00
Shed Costs			145.00			145.00			145.00
Total Contracted Piece Work			233.30			233.30			233.30
Motive Power:									
W-2	-	-	-	2.1	.68	1.43	1.9	.60	1.14
W-3	5.0	1.39	6.95	-	-	-	2.2	1.15	2.53
DT-3	-	-	-	2.8	2.52	7.06	.6	2.72	1.63
Total Motive Power			6.95			8.49			5.30

Continued-

Appendix Table 14 Contd.

Inputs	80 Acres			160 Acres			320 Acres		
	Units of Inputs Per Acre (hours)	Cost per Unit of Input	Total Cost	Units of Inputs Per Acre (hours)	Cost per Unit of Input	Total Cost	Units of Inputs Per Acre (hours)	Cost per Unit of Input	Total Cost
Farm Equipment:									
2-Row Lister	-	$ -	$ -	.5	$ .36	$ .18	-	$ -	$ -
4-Row Lister	.3	2.02	.61	-	-	-	.3	.56	.17
7' Offset Disk	1.0	.67	.67	-	-	-	1.1	.26	.29
7 1/2' Offset Disk	-	-	-	1.0	.41	.41	-	-	-
8' Chisel	-	-	-	.6	.50	.30	.6	.27	.16
8' Spike Harrow (2-4' Sect.)	.5	.76	.38	.5	.39	.20	.6	.18	.11
2-16" (2-way plow)	1.0	.74	.74	-	-	-	-	-	-
2-Row Planter and Fert.Attach.	1.1	5.60	6.16	1.2	2.64	3.17	1.1	1.54	1.69
2-Row Cultivator	1.0	.10	.10	1.0	.05	.05	1.0	.03	.03
12' Spike Harrow (3-4' Sect.)	.3	.38	.11	.3	.20	.06	.3	.11	.03
6' Steel Roller	.3	3.68	1.10	.3	1.89	.57	.3	1.02	.31
Total Equipment			9.87			4.94			2.79
Materials:									
Seed, dipped (Cwt.)	18.0	5.00	90.00	18.0	5.00	90.00	18.0	5.00	90.00
Water, (Acre feet)	2.5	7.71	19.28	2.5	7.00	17.50	2.5	6.62	16.55
Fertilizer (Lbs.)	825.0	.0266	21.94	825.0	.0266	21.94	825.0	.0266	21.94
Gypsum, refined (Tons)	2.0	12.00	24.00	2.0	12.00	24.00	2.0	12.00	24.00
Dust (Lbs.)	30.0	.0545	1.64	30.0	.0545	1.64	30.0	.0545	1.64
Gypsum, commercial (Lbs.)	500.0	.006	3.00	500.0	.006	3.00	500.0	.006	3.00
Total Materials			159.86			158.08			157.13
Miscellaneous:									
Compensation Insurance			.02			.10			.09
Taxes			6.25			6.25			6.25
Interest (5% on $300)			15.00			15.00			15.00
Total Miscellaneous			21.27			21.35			21.34
Total Cost Per Acre			444.57			438.90			432.32
Cost Per Cwt.			1.53			1.51			1.49

APPENDIX TABLE 15

Costs of Producing Potatoes on 80, 160, and 320 Acre
Farms with Organization III
(Yield 290 Cwt. Per Acre)

Inputs	80 Acres: Units of Inputs Per Acre (hours)	80 Acres: Cost per Unit of Input	80 Acres: Total Cost	160 Acres: Units of Inputs Per Acre (hours)	160 Acres: Cost per Unit of Input	160 Acres: Total Cost	320 Acres: Units of Inputs Per Acre (hours)	320 Acres: Cost per Unit of Input	320 Acres: Total Cost
Labor:									
Tractor Driver	5.0	$1.00	$ 5.00	4.9	$1.00	$ 4.90	4.8	$1.00	$ 4.80
Irrigator	9.3	.80	7.44	8.6	.80	6.88	8.6	.80	6.88
General	1.1	.80	.88	1.2	.80	.96	1.2	.80	.96
Total Labor			13.32			12.74			12.64
Contracted and Piece Work:									
Cutting Seed			4.50			4.50			4.50
Dusting			1.20			1.20			1.20
Rotobeating			3.00			3.00			3.00
Digging			10.00			10.00			10.00
Picking			40.60			40.60			40.60
Hauling			29.00			29.00			29.00
Shed Costs			145.00			145.00			145.00
Total Contracted Piece Work			233.30			233.30			233.30
Motive Power:									
W-2	-	-	-	2.1	.71	1.49	1.6	.64	1.02
W-3	5.0	1.38	6.90	-	-	-	1.4	1.13	1.58
DT-3	-	-	-	2.8	2.01	5.63	1.8	1.71	3.08
Total Motive Power			6.90			7.12			5.68

Continued-

Appendix Table 15 Contd.

Inputs	80 Acres			160 Acres			320 Acres		
	Units of Inputs Per Acre (hours)	Cost per Unit of Input	Total Cost	Units of Inputs Per Acre (hours)	Cost per Unit of Input	Total Cost	Units of Inputs Per Acre (hours)	Cost per Unit of Input	Total Cost
Farm Equipment:									
2-Row Lister	-	$ -	$ -	.5	$ .30	$ .15	-	$ -	$ -
4-Row Lister	.3	1.68	.50	-	-	-	.3	.45	.14
7' Offset Disk	1.0	.54	.54	-	-	-	1.1	.20	.22
7 1/2' Offset Disk	-	-	-	1.0	.34	.34	-	-	-
8' Chisel	-	-	-	.6	.42	.25	.6	.23	.14
8' Spike Harrow (2-4' Sect.)	.5	.45	.22	.5	.19	.10	.6	.09	.05
2-16" (2-way plow)	1.0	.62	.62	-	-	-	-	-	-
2-Row Planter and Fert. Attach.	1.1	2.78	3.06	1.2	1.31	1.57	1.2	.69	.83
2-Row Cultivator	1.0	.10	.10	1.0	.05	.05	1.0	.03	.03
12' Spike Harrow (3-4' Sect.)	.3	.32	.10	.3	.16	.05	.3	.09	.03
6' Steel Roller	.3	1.84	.55	.3	.94	.28	.3	.51	.15
Total Equipment			5.69			2.79			1.59
Materials:									
Seed, dipped (Cwt.)	18.0	5.00	90.00	18.0	5.00	90.00	18.0	5.00	90.00
Water (Acre Feet)	2.5	8.45	21.12	2.5	7.68	19.20	2.5	7.28	18.20
Fertilizer (Lbs.)	825.0	.0266	21.94	825.0	.0266	21.94	825.0	.0266	21.94
Gypsum, refined (Tons)	2.0	12.00	24.00	2.0	12.00	24.00	2.0	12.00	24.00
Dust (Lbs.)	30.0	.0545	1.64	30.0	.0545	1.64	30.0	.0545	1.64
Gypsum, commercial (Lbs.)	500.0	.006	3.00	500.0	.006	3.00	500.0	.006	3.00
Total Materials			161.70			159.78			158.78
Miscellaneous:									
Compensation Insurance			.03			.11			.10
Taxes			6.25			6.25			6.25
Interest (5% on $300)			15.00			15.00			15.00
Total Miscellaneous			21.28			21.36			21.35
Total Cost Per Acre			442.19			437.09			433.34
Cost Per Cwt.			1.52			1.51			1.49

APPENDIX TABLE 16

Costs of Producing Alfalfa on 80, 160, and 320 Acre Farms with Organization I
(Yield 8 1/2 Tons Per Acre)

Inputs	80 Acres			160 Acres			320 Acres		
	Units of Inputs Per Acre (hours)	Cost per Unit of Input	Total Cost	Units of Inputs Per Acre (hours)	Cost per Unit of Input	Total Cost	Units of Inputs Per Acre (hours)	Cost per Unit of Input	Total Cost
Labor:									
Tractor Driver	4.6	$1.00	$ 4.60	4.6	$1.00	$ 4.60	4.5	$1.00	$ 4.50
Irrigator	6.0	.80	4.80	5.7	.80	4.56	5.6	.80	4.48
Total Labor			9.40			9.16			8.98
Contracted and Piece Work:									
Baling ($3.65/T)			31.03			31.03			31.03
Roadsiding ($1.20/T)			10.20			10.20			10.20
Total Contracted Piece Work			41.23			41.23			41.23
Motive Power:									
W-2	-	-	-	4.6	.75	3.45	4.2	.66	2.77
W-3	4.6	1.54	7.08	-	-	-	.3	1.50	.45
Total Motive Power			7.08			3.45			3.22
Farm Equipment:									
7' Mower	2.4	.41	.98	2.4	.21	.50	2.3	.11	.25
8' Side Delivery Rake	2.2	.76	1.67	2.2	.39	.86	2.2	.21	.46
Total Equipment			2.65			1.36			.71
Materials:									
Water (Acre Feet)	5.28	7.41	39.12	5.28	6.73	35.53	5.28	6.35	33.53
Miscellaneous:									
Taxes			6.25			6.25			6.25
Interest (5% on $300)			15.00			15.00			15.00
Compensation Insurance			.01			.04			.08
Depreciation Stand			9.07			9.03			7.98
Total Miscellaneous			30.33			30.32			29.31
Total Cost Per Acre			129.81			121.05			116.98
Total Cost Per Ton			15.27			14.24			13.76

APPENDIX TABLE 17

Costs of Producing Alfalfa on 80, 160, and 320 Acre Farms with Organization II
(Yield 8 1/2 Tons Per Acre)

Inputs	80 Acres			160 Acres			320 Acres		
	Units of Inputs Per Acre (hours)	Cost per Unit of Input	Total Cost	Units of Inputs Per Acre (hours)	Cost per Unit of Input	Total Cost	Units of Inputs Per Acre (hours)	Cost per Unit of Input	Total Cost
Labor:									
Tractor Driver	4.6	$1.00	$ 4.60	4.6	$1.00	$ 4.60	4.7	$1.00	$ 4.70
Irrigator	6.0	.80	4.80	5.7	.80	4.56	5.6	.80	4.48
Total Labor			9.40			9.16			9.18
Contracted and Piece Work:									
Baling ($3.65/T)			31.03			31.03			31.03
Roadsiding ($1.20/T)			10.20			10.20			10.20
Total Contracted Piece Work			41.23			41.23			41.23
Motive Power:									
W-2	-	-	-	4.6	.68	3.13	4.3	.60	2.58
W-3	4.6	1.39	6.39	-	-	-	.3	1.15	.34
Total Motive Power			6.39			3.13			2.92
Farm Equipment:									
7' Mower	2.4	.81	1.94	2.4	.41	.98	2.3	.22	.51
8' Side Delivery Rake	2.2	1.52	3.34	2.2	.78	1.72	2.4	.41	.98
Total Equipment			5.28			2.70			1.49
Materials:									
Water (Acre Feet)	5.28	7.71	40.71	5.28	7.00	36.96	5.28	6.62	34.95
Miscellaneous:									
Taxes			6.25			6.25			6.25
Interest (5% on $300)			15.00			15.00			15.00
Compensation Insurance			-			.04			.08
Depreciation Stand			8.91			9.10			8.81
Total Miscellaneous			30.16			30.39			30.14
Total Cost Per Acre			133.17			123.57			119.91
Total Cost Per Ton			15.67			14.54			14.11

APPENDIX TABLE 18

Total Farm Budget Analysis for Organization I Farms Using 1949 Costs and Prices a/

	80 Acres	160 Acres	320 Acres
Cash Expenses			
Labor	$ 1,044.00	$ 1,946.00	$ 3,788.00
Motive Power:			
Fuel, Oil, and Grease	232.70	301.62	663.58
Repairs and Servicing	82.87	112.13	179.75
Taxes and Insurance	24.90	44.75	69.65
Farm Equipment:			
Repairs	34.34	41.56	89.72
Taxes and Insurance	34.71	33.50	42.31
Irrigation Equipment:			
Power	1,034.02	1,923.98	3,669.81
Oil and Grease	46.20	83.16	155.26
Repairs	143.90	266.89	508.69
Taxes and Insurance	135.00	230.00	435.00
Contract and Piece Work	10,254.25	20,508.50	41,017.00
Materials	5,891.00	11,409.00	22,402.00
Miscellaneous:			
Compensation Insurance	1.25	13.50	34.00
Land Taxes	500.00	1,000.00	2,000.00
Total Cash Expense	19,459.14	37,914.59	75,054.77
Cash Receipts			
Cotton (2.1 Bales/Acre @ $145/Bale)	7,612.50	15,225.00	30,450.00
Potatoes (290 Cwt/Acre @ $2.15/Cwt.)	15,587.50	31,175.00	62,350.00
Alfalfa (8½ Tons/Acre @ $19.00/Ton)	4,037.50	8,075.00	16,150.00
Cottonseed (762# Seed/Bale @ $55.00/Ton)	1,100.14	2,200.28	4,400.55
Total Cash Receipts	28,337.64	56,675.28	113,350.55
Total Investment b/	41,495.00	76,592.00	145,120.00
Total Depreciation	1,016.79	1,566.13	2,590.19
Unpaid Operator's Labor	1,055.78	895.94	676.30

a/ Organization consists of one-third cotton, one-third potatoes, one-third alfalfa.

b/ Less farm dwelling.

APPENDIX TABLE 19

Total Farm Budget Analysis for Organization II Farms Using 1949 Costs and Prices a/

	80 Acres	160 Acres	320 Acres
Cash Expenses			
Labor	$ 1,236.00	$ 2,249.50	$ 4,406.00
Motive Power:			
Fuel, Oil and Grease	274.48	357.25	775.94
Repairs and Servicing	84.33	115.15	184.66
Taxes and Insurance	24.90	44.75	69.65
Farm Equipment:			
Repairs	34.52	41.85	89.72
Taxes and Insurance	34.71	33.50	42.31
Irrigation Equipment:			
Power	994.80	1,855.29	3,547.22
Oil and Grease	43.30	77.96	145.53
Repairs	134.86	250.12	476.71
Taxes and Insurance	135.00	230.00	435.00
Contract and Piece Work	10,213.63	20,427.25	40,854.50
Materials	4,426.13	8,487.00	16,582.00
Miscellaneous:			
Compensation Insurance	.80	15.50	40.50
Land Taxes	500.00	1,000.00	2,000.00
Total Cash Expense	18,137.46	35,185.12	69,649.74
Cash Receipts			
Cotton (2.1 Bales/Acre @ $145/Bale)	15,225.00	30,450.00	60,900.00
Potatoes (290 Cwt/Acre @ $2.15/Cwt.)	7,793.75	15,587.50	31,175.00
Alfalfa (8½ Tons/Acre @ $19.00/Ton)	2,018.75	4,037.50	8,075.00
Cottonseed (762# Seed/Bale @ $55.00/Ton)	2,200.28	4,400.55	8,801.10
Total Cash Receipts	27,237.78	54,475.55	108,951.10
Total Investment b/	41,495.00	76,592.00	145,120.00
Total Depreciation	1,016.79	1,566.13	2,590.19
Unpaid Operator's Labor	1,188.18	794.16	768.42

a/ Organization consists of two-thirds cotton, one-sixth potatoes, one-sixth alfalfa.

b/ Less farm dwelling.

APPENDIX TABLE 20

Total Farm Budget Analysis for Organization III Farms Using 1949 Costs and Prices a/

	80 Acres	160 Acres	320 Acres
Cash Expenses			
Labor	$ 1,285.00	$ 2,339.00	$ 4,568.00
Motive Power:			
Fuel, Oil, and Grease	276.86	357.35	767.54
Repairs and Servicing	84.42	115.93	185.86
Taxes and Insurance	24.90	44.75	69.65
Farm Equipment:			
Repairs	29.63	35.86	79.32
Taxes and Insurance	29.76	28.55	37.36
Irrigation Equipment:			
Power	915.80	1,716.51	3,293.99
Oil and Grease	37.45	67.42	125.86
Repairs	116.65	216.34	412.31
Taxes and Insurance	135.00	230.00	435.00
Contract and Piece Work	12,614.50	25,229.00	50,458.00
Materials	6,080.00	11,818.00	23,280.00
Miscellaneous:			
Compensation Insurance	1.25	18.50	44.00
Land Taxes	500.00	1,000.00	2,000.00
Total Cash Expense	22,131.22	43,217.21	85,756.89
Cash Receipts			
Cotton (2.1 Bales/Acre @ $145/Bale)	15,225.00	30,450.00	60,900.00
Potatoes (290 Cwt/Acre @ $2.15/Cwt.)	15,587.50	31,175.00	62,350.00
Cottonseed (762# Seed/Bale @ $55.00/Ton)	2,200.28	4,400.55	8,801.10
Total Cash Receipts	33,012.78	66,025.55	132,051.10
Total Investment b/	41,000.00	76,097.00	144,625.00
Total Depreciation	972.24	1,521.58	2,545.64
Unpaid Operator's Labor	785.72	769.76	620.28

a/ Organization consists of two-thirds cotton, one-third potatoes (no alfalfa).

b/ Less farm dwelling.